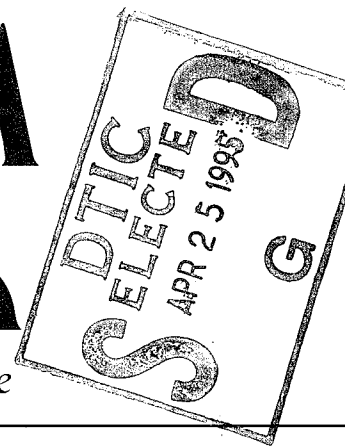# PROGRAM MANAGER

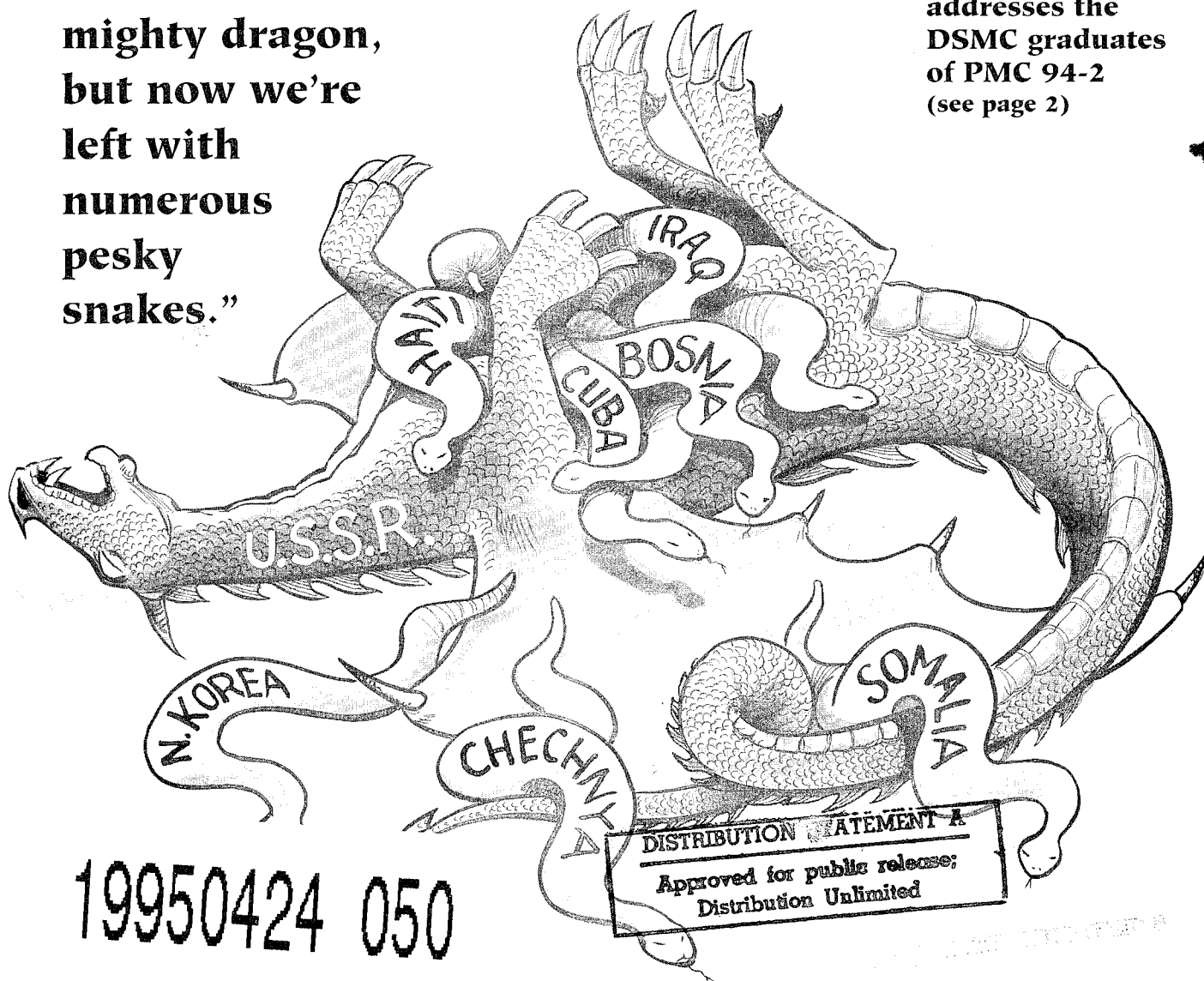*Journal of the Defense Systems Management College*

Foreign Technology Dependence

"Fly Before You Buy"

Lean Logistics

The Right Stuff - Revisited

"We have slain the mighty dragon, but now we're left with numerous pesky snakes."

Dr. Kaminski addresses the DSMC graduates of PMC 94-2 (see page 2)

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DR. KAMINSKI SPEAKS TO PMC 94-2 GRADUATES

"We have slain the mighty dragon, but now we're left with numerous pesky snakes."

Alberta Ladymon

Addressing the 421 graduates of the Defense Systems Management College (DSMC) Program Management Course (PMC) 94-2 at Fort Belvoir's Wallace Theater on December 9, 1994, Dr. Paul Kaminski, Under Secretary of Defense for Acquisition and Technology, told attendees: "The defense acquisition chall®nge facing us is driven by dramatic changes underway in the world today. I see us in a period of dual transition: one is a *needs* transition due to enormous changes in the national security environment; and the second change is what I would describe as a *sources* transition where we, in the Department of Defense (DoD), are promulgating a shift in the balance between the military and commercial elements of our national industrial base. We are moving our system to place greater reliance on commercial sources."

Changing National Security Environment

Dr. Kaminski spoke of the change in the national security environment, echoing comments of the Central Intelligence Agency Chief, Jim Woolsey: "We have slain the mighty Soviet dragon, but now we're left with numerous pesky snakes." He addressed

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Ms. Ladymon is special publications writer-editor, DSMC Press.

the nature of threat facing the U.S.; with the mean level of the single greatest threat — communist domination of the free world — dramatically reduced. A result of this lessening threat has led to a decrease in our force structure and the overall defense budget. Ironically, he points out, the variance of our collective residual threats — the pesky snakes — are up considerably, as can be seen with a 30-percent increase in deployments of U.S. forces worldwide. Dr. Kaminski credited Secretary Perry with placing proper emphasis on deployment and operational readiness in this evolving national security environment.

DoD Investment Strategy

The address outlined portions of an investment strategy for the DoD. Given the diversity of situations to be dealt with, the one thing not changing is "our policy of maintaining the technological supremacy of our fielded weapon systems. Our lessons learned here are very clear — the second best technology, the second best system, will just not cut it for the U.S. and for our warfighters. Desert Storm illustrates the point: second best means a very poor, last-place finish."

Our challenge in this environment is to "maintain technological supremacy in a period of fewer resources; doing so therefore, at an affordable cost."

The Department's renewed emphasis on reducing the cost of weapon system ownership is an important pillar in DoD's investment strategy. Dr. Kaminski spoke of the need to shift away from performance as the sole driving consideration, to move toward an environment where we adopt a more balanced "cost of performance" view: "Weapon system life-cycle cost should be viewed as an independent variable, not simply a fallout dependent variable."

The primary objective is to do the up-front trades and determine the incremental cost of a system's driving requirements. An important fact to remember is that 80 percent of system life-cycle costs are determined during the first 10 percent of the effort. Dr. Kaminski believes it is important to make the results of cost performance trades available to decision makers early in the acquisition process; rather than have an unwanted outcome occur downstream as a consequence of not having explicitly made those decisions. "The message here is to all of us — from program directors, to pro-

Honorable Paul G. Kaminski, Under Secretary of Defense for Acquisition and Technology

gram executive officers, to service acquisition executives, to myself in the defense acquisition executive role — we are responsible for providing our customers with the kind of explicit affordability information needed to make informed judgments about program alternatives."
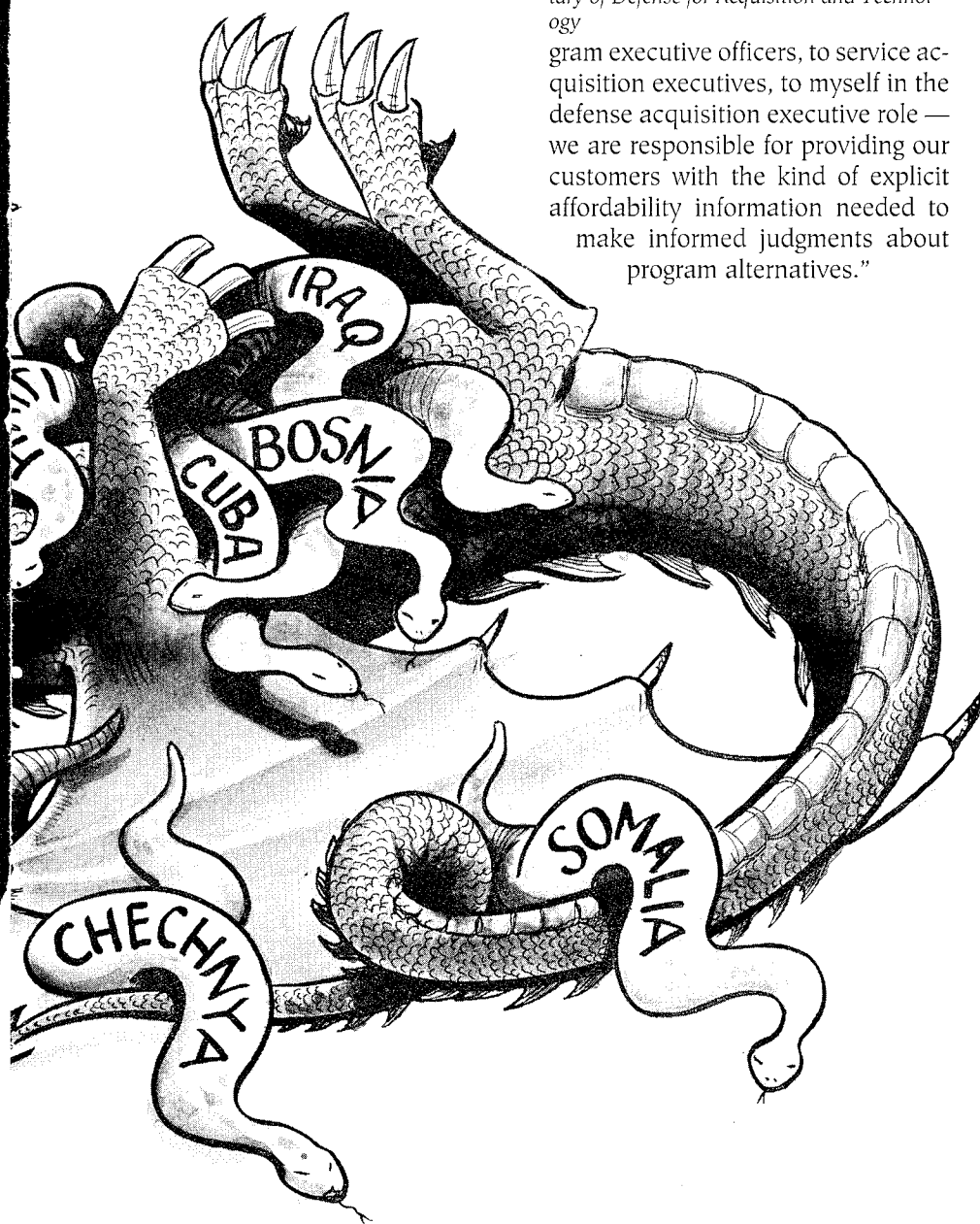
A second pillar of DoD's investment strategy is our effort to improve the defense acquisition system. Dr. Kaminski saw acquisition reform as proceeding in three stages:

Stage 1: Groundwork. "This stage, now behind us, was the groundwork laid by Bill Perry, Colleen Preston and many others." It was completed with passage of the Federal Acquisition Streamlining Act (FASTA) of 1994. This Act provides an excellent foundation and is especially helpful in two small-purchase categories — under $25,000 and under $100,000.

Stage 2: Implementation. "It's here and now — time for doing and not just talking." We must "unlearn" some of the accumulated lessons we've learned to make the defense acquisition system truly responsive. This stage also deals with improving the processes for procurement of medium- to large-size systems.

Stage 3: Another Round of Legislation. This stage is directed toward enactment of a legislative package — FASTA II — for relief from restrictive statutes not dealt with earlier. It is intended to remove many of the statutory impediments to efficient acquisition of large systems. "I see us moving to the third stage now — even as we're making progress on Stage 2 implementation." Dr. Kaminski envisions acquisition reform will proceed by facilitating three key cultural shifts:

1. Moving from an environment dictated by regulations to one where performance incentives motivate the right behaviors. Our goal is to provide a climate for reasoned, well-informed risk taking by program managers.

2. Changing from a tradition of hierarchical decision making to a process where decisions are made across organizational structures by integrated product teams. Decisions need to be pushed down to the lowest lev-

els where it's appropriate to do so. This means that our senior acquisition staffs need to be in a *receive* mode to be receptive to input from the field — not just a *transmit* mode. It is important to create incentives for good ideas and "best practices" to bubble up from the outstanding people working in the field.

3. "Shift away from a one-size-fits-all classical acquisition approach to tailored approaches, adjusted on a program-by-program basis." Implementation will be in the form of "pilot-like mechanisms" to serve as agents for change.

Dr. Kaminski identified "leveraging the U.S. industrial base" as a third necessary pillar of DoD's investment strategy. A dual-use strategy is essential in today's world. The objective is to leverage both the technology and production components of our commercial industrial base. The DoD no longer paces technological change in many areas; the way is being paved by the commercial sector. The DoD needs to learn how to best capture what is going on in the commercial world; and then influence the development of high-payoff commercial technology through selected application-specific projects "without having to make root investments by ourselves." Dr. Kaminski realizes complex defense systems will not typically be manufactured as end items on commercial lines; however, subsystems and components for those defense systems probably could be manufactured in commercial or in common production facilities.

According to Dr. Kaminski, the benefits of a better leveraged industrial base are not only reduced cost, but reduced cycle times as well. "In DoD, we can't afford a 15-year cycle time with a commercial cycle turnover every 3-4 years. In a global market, everyone — including our adversaries — has access to the same commer-cial technology. The advantage will go to the nation who has the best cycle time to capture what's available commercially, get it incorporated in weapon systems, and get it fielded."

Dr. Kaminski identified a fourth key investment strategy element: improving logistics and support. "In the current budget environment, life-cycle costs will have great weight in our calculus of what to build." It is important to consider "back end" sustainment costs up front in the design of a new system. In reviewing inventory costs, Dr. Kaminski finds DoD wholesale active spare inventories are valued at $77 billion, with annual outflows approaching $11 billion. About $18 billion is war reserve materiel stocks. Even without the war reserve stocks, "the inventory turns ratio is unimpressive when compared to certain commercial commodities. I wouldn't say we can manage this inventory in exactly the same way commercial inventory is managed — but I would say there is probably some room for improvement." An additional cost of $13 billion is spent annually on depot maintenance. Summing depot maintenance and annual spares outflows together provides an annual cost not far from what DoD is spending on procurement. The strategy is to reduce back-end support costs and plow the savings back into modernization accounts "in this period when we're stretched very thin on the resources needed to support our current force."

Conclusion
In closing, Dr. Kaminski restated his vision of fielding technologically superior systems at an affordable cost. A DoD investment strategy meeting this challenge can be implemented "if it has ownership by people like you in the field. Together we have an opportunity to fundamentally change the way we do business. I would refer back to a quote by President Kennedy: 'Some look at things as they are and ask *why*—others look at things as they could be and ask *why not.*' I invite you to join me in asking *why not.*"

NATO'S NAMSA INAUGURATES ITS GROUP FACILITATION CENTER

A New Way of Making Decisions

Louis Evangelista

An important event took place on 27 September 1994 at 1600 hours at the North Atlantic Treaty Organization (NATO) Maintenance and Supply Agency (NAMSA), located in the Grand Duchy of Luxembourg. The NAMSA General Manager, H. Schmidt-Petri, Major General, presided over the official opening ceremonies for the NAMSA Group Facilitation Center.

The facility uses GROUPWARE technology — computer-based and computer-aided facilitation tools and techniques. The term GROUPWARE loosely describes software support for groups working collaboratively on projects. As a generic term, it refers to "a group of technologies that mediate interpersonal collaboration through the computer."[1]

Specialized computer aids designed for use by collaborative working groups were reported to produce measurable productivity gains. Software for electronic meetings, in particular, were purported to reduce the time required for managers to com-

Mr. Evangelista is the Chief, Manpower, Organization and Methods Division, NATO Maintenance and Supply Agency (NAMSA), located in the Grand Duchy of Luxembourg.

The Group Facilitation Center will enable the Agency to implement a new way of making decisions.

plete complex projects by significant amounts. The Agency learned about this kind of facility, generally known as an electronic meeting system, from the U.S. Defense Information Systems Agency.

The General Manager explained in his opening remarks that the Group Facilitation Center will enable the Agency to implement a new way of making decisions since it is a tool designed to help teams in working together to achieve results. It will be available to many NAMSA users.
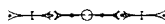
As shown in the Figure, the facility will help teams through the decision making process of a meeting in a more effective and efficient manner. The advantages of using the NAMSA Group Facilitation Center should be seen in terms of its support to decision making through—

- anonymity, which removes the barriers in meetings due to emotions, rank and personality;
- parallel processing, as all participants can work simultaneously on the same issues; and
- documentation, by instant recordkeeping and reporting of the results of meetings.

The operational core of the NAMSA Group Facilitation Center is its specific hardware and software configuration.

The Hardware consist of—

- Local Area Network: Network for 12 users' laptops, two personal computer workstations, LCD flat screen, color projector, electronic white board, scanner, server, two printers and a copier.

The Software consist of—

- GROUPSYSTEMS V: The system enabling GROUPWARE operation, composed of a suite of 14 tools,

such as Electronic Brainstorming, Outliner, Alternative Evaluator, Group Writer, Vote, etc.

- CM/1: Corporate Memory 1 allows the exploration and evaluation of difficult issues by documenting positions, arguments and decisions. This computer-based tool supports discussions of issues in a structured way by identifying and inter-relating issues, alternative solutions and advantages/disadvantages.
- IDEF0: Integrated DEFinition is an activity modeling technique that is used for detailed process analysis. The models created describe processes in terms of their inputs, outputs, controls and mechanisms. This technique is used to model the decisions, actions and activities of an organization or system to identify non-value adding and limited value adding activities, which are to be eliminated prior to automation.
- Office Automation: These are standard automated office applications, such as *Excel, Word, PowerPoint*, etc.

The General Manager pointed out that three key ingredients make the facility work:

(1) An initiator or team leader requests a session in the facility.
(2) Facilitators help the teams through their sessions. These individuals are specially trained to handle the GROUPWARE software and to facilitate helping the team leader in planning and running the team sessions.
(3) Participants, identified as the team members, must be open-minded and adventurous.

For further information concerning the Center, please contact the Chief, NAMSA/AE, Telephone 011 (352) 30 85 85 254, Telefax 011 (352) 30 87 21, Mailing Address: NAMSA/AE, UNIT 4045, APO AE 09126-4045.

Reference

CW Custom Publications, 375 Cochituate Road, Framingham, MA 01701

FIGURE. *Process of a Meeting*

Start with an issue

Process of a meeting

Diverge

Share

Converge

Decision on issue

Support by Groupware

◀ Generate ideas

◀ Organize, evaluate and share ideas

◀ Reduce options and reach consensus
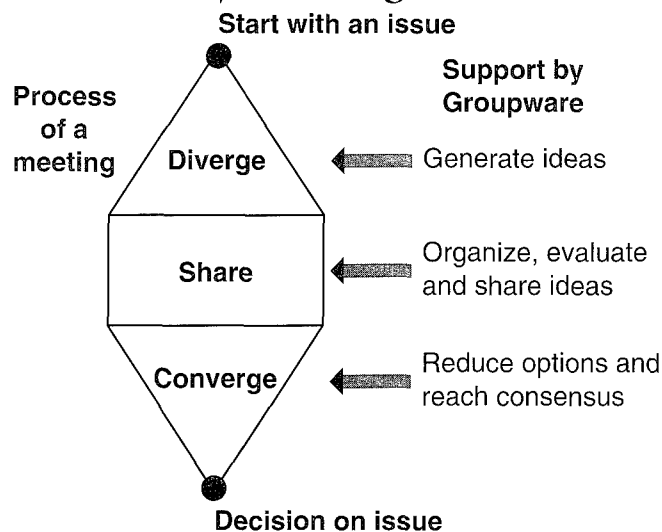
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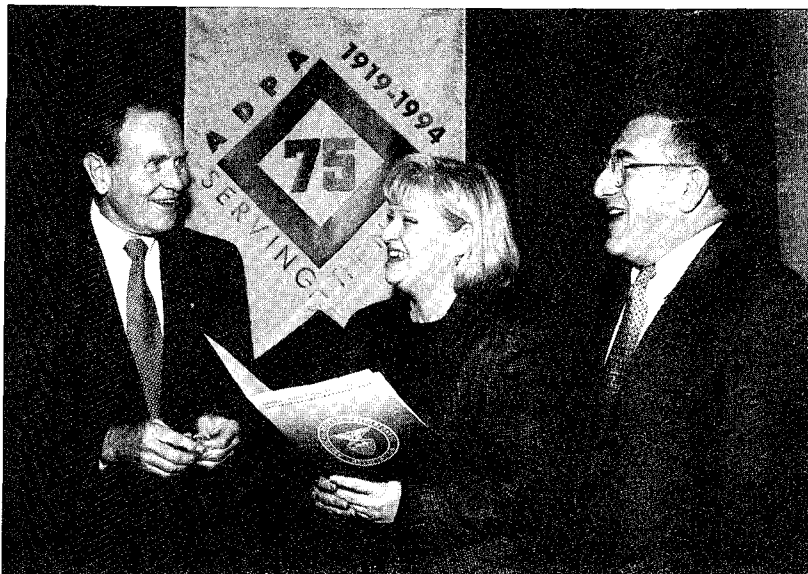
During a 7 December 1994 Defense Systems Management College (DSMC) student field trip to the American Defense Preparedness Association (ADPA), Rosslyn, Va., PMC 94-2 industry student, Diane Copenhaver, receives an orientation on how industry representatives in the Washington area do their jobs and interact with Government procurement authorities. Pictured from left: Lt. Gen. Lawrence F. Skibbie, USA (Ret.), President, ADPA; Diane Copenhaver, Boeing Company; George Krikorian, Industry Chair, DSMC.

Photo by Richard Mattox

CALL FOR PAPERS
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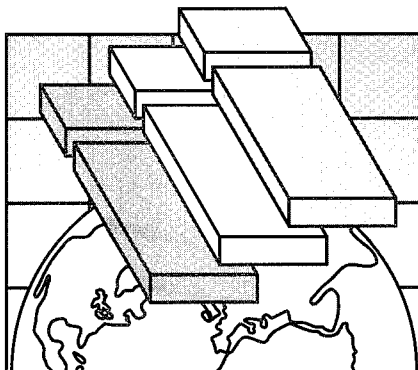
Sponsored by the Deputy Under Secretary of Defense (Acquisition Reform)
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The 1995 theme is "**Acquisition for the Future: Imagination, Innovation, and Implementation**," and the sub-theme is "**Acquisition Reform: A Mandate for Change — Reengineering the Acquisition Process**." Papers that address the theme, subtheme and current issues in acquisition management will be especially relevant. Topic areas include:

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- Systems Performance and Test/Evaluation

To be considered, all papers should include the **Title, Topic Area, Author(s) Name, Business Address and Telephone Number**. If a paper is submitted with more than one author, the primary author should be listed first.   All communications will be addressed to the primary author. Paper guidelines are available upon request to: Ms. Joan L. Sable, DSMC Program Co-Chair, at (703) 805-2525/2289 or DSN 655-2525/2289.

Prospective authors must submit *three copies* of their paper and, if possible, electronic media on a 3 1/2" disk no later than **February 24, 1995**. Paper will be evaluated to be accepted as session presentations and/or published in the *1995 Acquisition Research Symposium Proceedings.*

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Schedule:
Paper Deadline: **February 24, 1995**
Notification: **April 1995**
Registration Information: **April 1995**
Symposium: **June 28-30, 1995**

IS "FLY BEFORE YOU BUY" OBSOLETE?

The Need for Rapid but Disciplined Acquisition

Rear Adm. John J. Zerr, USN • Lt. Mike Oldenburg, USN

Operational test and evaluation has historically been based on an acquisition and discipline methodology known as "Fly Before You Buy." Many years of difficult lessons learned and a need for discipline and structure led to organizing the acquisition process into a series of phases and milestone decisions.

Recent efforts to economize acquisition led to reevaluating this structure and the role of operational testing. Any reform effort, however, must not lose sight of disciplining the acquisition process through sound management, informed decision making and planning, as well as thorough test and evaluation.

Where We Stand Now

Many forces are driving us to speed the pace of acquisition reform — forces ranging from the highest levels in the Department of Defense to selected commanders in chief throughout the Services. Fortunately, systems now in development promise a dramatic military advantage. Further, some of the

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Lt. Mike Oldenburg, USN, is currently the operational test director for submarine communications projects on the COMOPTEVFOR staff, Norfolk, Va.
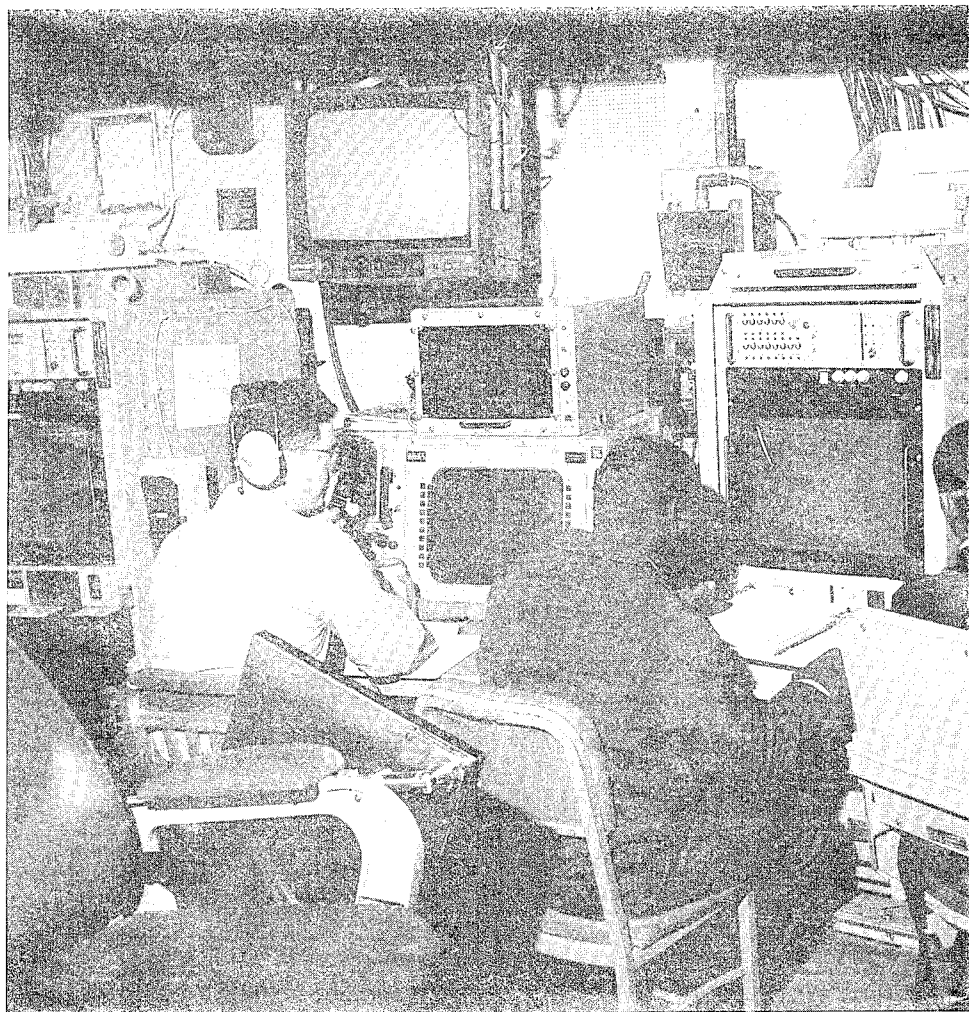
The Navy Tactical Command System Afloat (NTCS(A)) terminal aboard the USS Kittyhawk (CV63).

new systems are cheaper than systems they will replace.

Because of the rapid rate of technological advances and the need to economize, rapid acquisition is an absolute requirement. The problem arises when the drive for speed bulldozes aside many of our acquisition discipline measures. Thus, we need *rapid* acquisition, but we also need *disciplined* acquisition.

Problems resulting from acquisition with inadequate discipline may be the loss of important programs, schedule slips, scandal, and systems that are ineffective and insupportable in the field. Initially acquisition planners tailored "Fly Before You Buy" to hardware-intensive systems that DoD developed to meet military needs—systems for which there were no equivalents in the commercial sector.

Now, many of our systems are software-intensive, and many of the

military's needs can be met in the commercial sector. The challenge is to impose the right new discipline on the acquisition of software-intensive systems without slowing or derailing efforts to reform and streamline.

Initially, the latest round of acquisition reform aimed at dramatic change. When that proved too hard, thinking focused on how to speed programs along by streamlining the processes prescribed by current law. To date, acquisition streamlining manifests the following principal characteristics:

• Considerable reliance on non-developmental items/commercial off-the-shelf (NDI/COTS) technologies.

• Advanced Concept Technology Demonstrators (ACTD).

• Deletion of the military specification library.

• Bypassing many of the old constraints that slowed but also disciplined acquisition.

Is Streamlining the Wave of the Future, or Are We Already Behind?

Acquisition reform and streamlining can improve many acquisition-related areas and current acquisition practices. Although ACTDs are still progressing from policy pronouncements to programs, many areas in the acquisition business are already streamlined from the operational tester's point of view. The Navy Tactical Command System Afloat (NTCS(A)) and the F-14D are examples of programs where new acquisition practices rendered our old discipline and our old operational test and evaluation philosophy obsolete.

Navy Tactical Command System Afloat

Recently, the Navy's Operational Test and Evaluation Force (OPTEVFOR) completed an operational evaluation (OPEVAL) on NTCS(A). The NTCS(A) is the Navy's primary command, control, communications and intelligence (C³I) system. The system receives, processes and displays an integrated fusion of

organic and inorganic tactical, surveillance and intelligence data, providing the afloat fleet commander with information necessary to direct the battle force.

Composed predominantly of COTS computers, the system resides in a distributed local area network throughout the command and control spaces. In an OPEVAL, OPTEVFOR examines the operational effectiveness and suitability of a system and makes a recommendation about introducing the system to the fleet. At the time of OPEVAL, the Navy maintained two versions of hardware and two of software on over 200 ships. Thus, a recommendation regarding fleet introduction was meaningless, and OPEVAL was too late to perform any kind of acquisition discipline or even to serve a quality assurance function.

F-14D

On the F-14D program, the Navy's purchase of the aircraft is complete, and two squadrons already completed their first deployment to the Indian Ocean and Persian Gulf. Yet, we still haven't started the phase of testing that should have released the funding for production. Our old testing paradigm said we could not conduct an operational test until all key systems were available to support a full system test. We have the F-14D, but we do not have four important subsystems, and thus have not gone to test.

Acquisition managers encountered significant delays with the subsystems, and since the F-14D has significant advantages over the older models, procurement authorities made the decision to field the aircraft. And although we made the decision to field the aircraft, our old philosophy said we should not go to test until all the subsystems were available.

Fielding a system like this, however, without complete testing, poses problems for fleet operators of the F-14D and for fleet commanders interested in the true state of their force

U.S. Navy F-14Ds fly in formation.

readiness. Fleet operators depend on the operational testers to generate initial tactical manuals and users' guides. The guides were an important and natural by-product of the discipline measures imposed on the old acquisition process.

Obtained from the results of disciplined testing on unique ranges where actual threat conditions are replicated, the guides are of considerable value. Measurement of system performance on these ranges is also important in assessing readiness. Here, readiness means a war-winning readiness—not (as commonly used) a measure of preparedness to go to war.

In situations like this, where a major system is ready for operational testing but some key subsystems are not, one solution could be a revision to the system requirements. Two reasons underlie the difficulty of this solution: (1) the extremely slow process of updating key program documents such as the Operational Requirements Document; and (2) our acquisition philosophy of "Fly Before You Buy."

Program managers typically find considerable resistance to do anything that looks like downscaling requirements. This resistance resulted from a key feature of the "Fly Before

You Buy" philosophy—a total absence of trust between the two sides of the acquisition process. The operational testers, DoD acquisition oversight agencies and the Congress were on one side; program managers, contractors and sponsors were on the other. This mistrust led to the impression that attempts to downscale requirements were dishonest activities by merchants who could not deliver what they promised.

Currently, "Fly Before You Buy" Doesn't Work With Streamlined Acquisition

Within the last several years, some DoD personnel began to appreciate the fact that the pace of advancing technology in the civilian sector, especially in communications and computers, had outstripped the capability of DoD acquisition processes to keep pace. The same personnel also believed acquisition strategies that could keep pace with the rate of technology advances were incompatible with our older, slower acquisition philosophy, "Fly Before You Buy."

As acquisition planners developed faster acquisition processes, they pushed the old discipline measures aside because these measures made acquisition too slow. Therein lies the real problem with streamlining to this

point. The old discipline measures were pushed aside, and no new discipline measures, compatible with streamlining, are in place.

Not all would agree that the "Fly Before You Buy" idea is outdated. Also, the concept probably means different things to different people. Usually, "Fly Before You Buy" includes the following principal characteristics:

• Many discipline measures that make up the philosophy were put in place because of lack of trust.

• Requirements, once approved, are viewed as "chiseled in stone."

• Full-rate production decisions are based on OPEVAL results.

• Only limited-rate initial production items can be acquired prior to OPEVAL.

• Test and evaluation events are driven strictly by program forces.

• Program documents are approved through a slow, laborious serial process.

• Systems are fielded only after demonstrating performance sufficient to pass mature thresholds.

• Most operational testing is quality assurance at the end of a development process.

Prior to declaring "Fly Before You Buy" obsolete, the kinds of weapons systems to be acquired in the future should be considered. In general, three categories can be defined: weapons; command, control, communications and intelligence (C^3I) systems; and information systems. Currently, many systems in all three categories are software-intensive, posing special test and evaluation problems. The acquisition strategy and the discipline (including testing) philosophy should be matched to the specific program, depending on its category.

Two Processes That Do Work

Before considering new acquisition discipline measures, let's look at some acquisition processes that are working well. The first is the software development process in effect at the Weapon System Support Activities (WSSA) at China Lake and Point Mugu, California. These facilities develop software for the mission computers of tactical jet aircraft.

The development process consists of a module-by-module build. The laboratory assembles and tests the first module. Laboratory personnel then play the module on a Hardware in the Loop (HIL) facility where developmental and operational test pilots evaluate the module's performance. After module one performs satisfactorily, these same personnel add module two to module one, and again test in the lab and HIL facility.

This disciplined module-by-module process (build, test, fix, build, etc.) continues until the entire package of software plays satisfactorily on the HIL facility. Laboratory personnel then release the software for developmental test (DT) flight. After fixing DT deficiencies, they release the software for operational test (OT) flight and also to the fleet for training. This achieves two benefits over our previous test philosophy: an expanded database from which to evaluate the software's performance, and the fleet starts training early with new software.

Over the years, acquisition planners at the WSSAs developed confidence in the software development process, resulting in the simultaneous release of the software for both training and OT. In years past, when confidence in the development process declined, each new set of software required an OPEVAL prior to any release to the fleet.

During a visit to the UNISYS plant in Plymouth, Michigan, OPTEVFOR examined a second developmental process to gain insight into how in-

dustry imposes discipline on its commercial product development. The UNISYS Corporation's main product line is machines to automatically read and process checks. Interestingly, UNISYS managers reported that the biggest problem for engineers and manufacturing personnel was in understanding the requirements. At this plant, the company brings the customer in at the start of a program, and the requirements are written. The engineers then immediately set to work to develop a prototype for the specific purpose of refining the requirements.

On most of their programs, the requirements are refined based on what they learn from the prototype about technical problems and cost/performance tradeoffs. Other disci-

pline measures at UNISYS consist of disciplined development of complex software packages, similar to the process used by the WSSAs, and early testing to find and fix problems as early and cheaply as possible.

Maintaining a High Level of Readiness is the Fundamental Goal

At times, acquisition can seem like an end unto itself. But acquisition does play on a larger field. For the Navy, the larger field is the Navy and Marine Corps strategic vision, "From the Sea." A singularly important aspect of "From the Sea" is that the Navy and Marine Corps must be able to fight unaided for the first two to three weeks of the next conflict. This means that the Navy's deployed forces must be at a high level of readiness and able to quickly transition from presence to combat operations. For readiness to be high, acquisition processes must work faster and more cheaply because of the following:

• Budgets were reduced.

• Technology is advancing rapidly in many areas, especially in C^3I and other software-intensive systems. Many systems in these areas are important because they provide a combat effectiveness multiplier effect.

• The weapons technology available to the U.S. military, in some key areas, lags the technology of other countries.

As stated earlier, some streamlined acquisition processes are already devised. With the signing of the Federal Acquisition Streamlining Act of 1994, others will surely follow. No new discipline measures are in place, and some forces are working counter to discipline.

Many in the fleet, aware of available technology, call for high-technology systems faster. Battle group commanders call for command and control systems tailored to their indi-

> Occasionally, our acquisition process responded too readily, and with inadequate concern for discipline, to these calls from the fleet. As a result, we deployed some systems that were not thoroughly tested.

vidual preferences. Occasionally, our acquisition process responded too readily, and with inadequate concern for discipline, to these calls from the fleet. As a result, we deployed some systems that were not thoroughly tested. Moreover, we have deployed carrier battle groups with immature command and control systems that require two months of grooming before the systems are fully functional after the start of a deployment.

Discipline is Essential to Readiness

Discipline in the acquisition process is exceedingly important. Without discipline we are in danger of losing credibility, and we endanger readiness. If we lose credibility with the oversight agencies and with the Congress, acquisition funding can be lost. We could also lose the gains made by streamlining to this point. Untested systems in the fleet and immature command and control systems reduce our readiness. The threat here is that acquisition with inadequate discipline can put us in a position where we can't deliver on our promises in "From the Sea."

Characteristics of a faster, disciplined acquisition process should reflect the following actions:

• Develop a less rigid, more sensible requirement-setting process. Requirements should iterate, and requirements refining processes (like the UNISYS model) should be used, where appropriate. For NDI/COTS acquisitions, the process of establishing requirements should follow these steps: the appropriate parties agree to the list of test parameters to be measured; then establish thresholds, if possible; establish goals where thresholds are not possible; and, if goals are not possible, then test and compare the results to existing system performance.

• Test early (including OT) to reduce risk and to prove the product using models, simulators and HIL facilities.

> **Acquisition with inadequate discipline can lead to loss of credibility that could result in loss of funding and loss of the gains made by streamlining.**

• Use OPEVAL as a final proof-of-the-product test, but also as a proof-of-the-process test for software developers.

• Field new systems when they mature to the point where they exceed existing capabilities and are supportable. Then expand on system capability with hardware and software upgrades (evolutionary acquisition).

• Conduct OT prior to fielding using sensible thresholds.

• Develop and use software metrics.

• Test cheaply by doing more concurrent DT and OT. Work to do nonintrusive OT concurrently with fleet training.

• Speed the approval process of key acquisition documents by using concurrent review and approval, and electronic document transmission.

Summary

There is a direct link in "From the Sea," to readiness, to acquisition. "From the Sea" demands high readi-

ness and streamlined, disciplined acquisition. Because no such system was available in the commercial sector, we tailored "Fly Before You Buy," our traditional acquisition discipline methodology, to hardware-intensive systems requiring a dedicated development effort.

Today, most systems are software-intensive, and the commercial sector has much to offer to satisfy military requirements. To take advantage of the products available commercially, to economize, and to speed acquisition, the DoD launched a program to streamline acquisition. Streamlining efforts to date shunted aside many of the acquisition discipline measures from the original "Fly Before You Buy" philosophy, and no new discipline measures, tailored to match streamlined acquisition, are in effect.

Acquisition with inadequate discipline can lead to loss of credibility that could result in loss of funding and loss of the gains made by streamlining. It can also negatively affect readiness and imperil our ability to deliver on our promises in "From the Sea."

In order to bring the "Fly Before You Buy" philosophy in line with today's environment, we should acknowledge that we need a DoD acquisition disciplining strategy encompassing the following areas: more early OT to reduce risk; more trust between oversight and program management; more innovative thinking to devise more economic testing through combined DT/OT; more use of models, simulations and hardware in the loop facilities; and a more sensible approach to requirements.

This new approach could be called "Fly Before You Buy, SC (Streamline Compatible)." This is not a radically new approach, but it does alter the characteristics of the basic philosophy to remove those aspects that accomplished discipline by needlessly stretching the time for acquisition.

THE PROJECT MANAGER'S SURVIVAL GUIDE
The Handbook for Real-World Project Management

Battelle Press

by Donald Penner
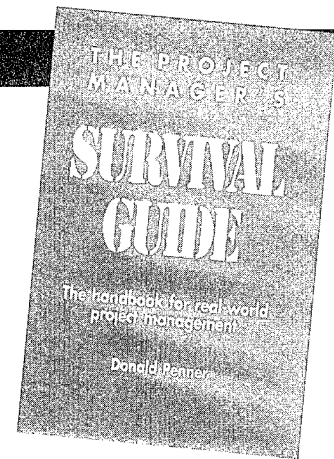
The author, Dr. Donald Penner, has over 20 years of experience in program management, research and consulting for private industry and government. Based on the experiences of the author and interviews conducted with various executives, line managers and project managers, the book serves as a desktop guide for project management. Making use of an outline-type format, the book can be read quickly, and information can be accessed easily. Each chapter addresses a specific aspect of project management and includes a section titled, "How to Get in Trouble," which provides examples of common pitfalls.

The book also includes several appendices. Two of the more notable appendices are questionnaires. One can be used as a personal assessment of your leadership skills, using a simple rating system. The other is a project manager's checklist that is designed to help identify problem areas during each stage of a project. This checklist is a condensed version of the issues addressed earlier in the book.

The guide is designed primarily to assist a prospective project manager in preparing for project management. Initially, the author provides guidance in assessing the project and its value to the manager. This is accomplished through the use of critical questions the prospective manager should ask about the project. The intent is to determine if there is a good match between the project and the manager's professional goals, and to assess the potential of the project to be realistically accomplished.

Dr. Penner then uses several of Peter Drucker's key management functions as a framework for discussions on project management. Leadership is discussed from the perspective of responsibilities and authority. The leadership skill questionnaire is referenced as a tool to help you identify your effectiveness as a leader in a team-oriented environment. However, the book falls short in that no other guidance is provided to assist the manager in working to improve lower-rated qualities.

Dr. Penner then addresses the key management functions of planning and control. The use of a work breakdown structure (WBS) is presented as one of the key elements in planning the application of available resources in project management. Building upon the WBS as a management tool, the author recommends creating a responsibility matrix and resource estimates for the lower-level work packages.

Network charts, Gantt charts and risk management are discussed briefly as additional planning and control tools. Organizing and staffing are addressed from the perspective of meeting project objectives. A great deal of emphasis is placed on the importance of developing an organization that fosters the flow of work and the importance of team building. The author discusses the four stages of team development and provides recommended actions for the leader of each phase of the team's development.

The final two chapters deal with the running and closedown of a project. The chapter on running a project contains a good discussion on the use of a concurrent control method, identified as "feedforward control," as opposed to the use of a "feedback control" method. Dr. Penner stresses that reducing the magnitude of errors in a project in order to achieve more effective control is essential. This, he asserts, can only be accomplished by identifying the critical inputs and processes of a project and instituting the use of "feedforward control" to initiate corrective action early in the process. The chapter on project closedown emphasizes the need to document the project, provide recognition of the personnel who supported the project, and to develop a detailed closedown plan.

In summary, this is a short, concise desk guide for project management. It does not provide a complete cookbook for project management or a list of miracle cures to help an ailing project. However, it does provide key, basic points to remember when managing a project and some recommendations to help promote the success of a project.

Cdr. William Vaughan, USN, is a Professor of Acquisition Management, Principles of Program Management Department, Faculty Division, Defense Systems Management College.

LEAN LOGISTICS

Its Time Has Come!

Col. Arthur B. Morrill III, USAF

Some might suggest the most profound changes imaginable in our Air Force resulted in restructuring of our operational wings. While these were undeniably far-reaching changes, others might conclude that *from a logistics perspective, even greater changes are those affecting and improving our core logistics processes and capabilities.* Lean Logistics is a **system** of innovations that does just that.

With this in mind, I'll address three components of this evolving Air Force logistics environment—change, challenge and opportunity. The section regarding ongoing change highlights key initiatives under the "Lean Logistics" umbrella. Under challenges, I'll emphasize the need for logisticians to vigorously pursue continuous improvements in all aspects of the logistics arena. And finally, I'll summarize how change and challenges will lead to opportunities for all logisticians as we end this century.

Lean Logistics: A New Era of Change

Lean Logistics is an interrelated series of logistics initiatives that pro-

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mote combat capability, enhance our warfighting sustainability, shrink the logistics footprint and reduce infrastructure. The goal is to *enhance combat capability while reducing the annual operating costs of Air Force systems by adopting state-of-the art business practices and streamlined processes, and by reducing infrastructure throughout the Air Force logistics community.*

Three ground rules apply. First, the Air Force "benchmarks" readiness and system availability at required Air Force rates to meet two, nearly simultaneous major regional contingencies or peacetime commitments—whichever are higher. Second, Lean Logistics business practices and processes are applicable

Lean Logistics is an interrelated series of logistics initiatives that promote combat capability, enhance our warfighting sustainability, shrink the logistics footprint and reduce infrastructure.

and *effective* in peacetime and during contingencies, in the continental United States (CONUS) and overseas. Third, logistics infrastructure reductions achieved by Lean Logistics allow the Air Force to operate effectively with fewer resources, while sustaining force structure, peacetime optempo and combat readiness.

How does Lean Logistics change our current approach to logistics? Figure 1 helps illustrate the improvements. Our first foray into "leaner logistics" and enhanced readiness was Two-Level Maintenance (2LM), which now holds the prominent position in the Lean Logistics architecture. Two-Level Maintenance is an Air Force initiative that was implemented on 1 October 1993 via a phased-in schedule after a series of convincingly successful tests. The importance of this initiative is twofold: Two-Level Maintenance improves the operational focus, while simultaneously reducing the Air Force's mobility footprint and costs associated with supporting Air Force weapon systems. It does so by improving the "tooth-to-tail" ratio ("tooth-to-jawbone" says Lt. Gen. (Ret) Marquez).

For example, converting selected avionics and engines from three to two levels of maintenance reduces intermediate-level maintenance requirements, thereby permitting reductions in base-level maintenance and support personnel, equipment and facilities. In addition, the Air Force also achieves personnel savings by reducing 4,430 manpower positions Air Force-wide from intermediate maintenance.
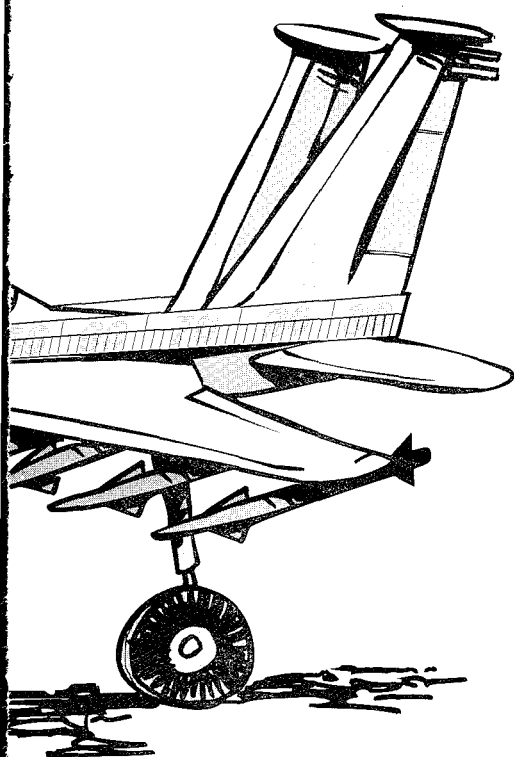
Also, the Air Force reduces equipment purchases and maintenance by 10 percent over the Future Years Defense Program. *However, they maintain readiness under 2LM by controlling and streamlining all aspects of the repair pipeline.* Broken parts move from bases to repair centers at Air Force depots and then return to the bases, all at "high velocity" via highly reliable transportation. In doing so, depot repair centers combine 2LM work with existing depot-repair capabilities.

Finally, 2LM not only saves resources, but also enhances our ability to support contingencies by reducing the "mobility footprint." Two-Level Maintenance relieves us from deploying intermediate repair equipment—in an F-16 squadron, more than 100 tons of engine maintenance and avionics equipment! We're also relieved of the need to put 50 avionics and engine technicians in harm's way.

What makes this streamlining possible? The answer is deceptively simple: Two-Level's daily, time-certain delivery and return of critical spare parts. Daily time-certain delivery will use the commercial CONUS infrastructure of the CRAF express carrier in peacetime, and Military Overnight Express (MOE) during contingencies. Military Overnight Express is the military adaptation of commercial overnight delivery. It consists of the express carrier's CONUS infrastructure, Air Mobility Command aircraft, and a theater distribution system for express shipments. The Air Mobility Command will provide daily round-trip, direct service between the express carriers' CONUS hubs and the designated aerial ports of debarkation. The theater commander will establish a distribution system that provides next-day delivery of critical cargo.

The elements that make Lean Logistics initiatives invaluable to warfighters are high-velocity transportation and the highly reliable transportation of parts in peacetime and during conflict, in CONUS and overseas. In fact, these components serve as the foundation for the Air Force's increasing use of modern business practices such as

Figure 1. Changing the Logistics Process

TODAY'S LOGISTICS	LEAN LOGISTICS
Characteristics	*Characteristics*
- Big Inventory	- Smaller Inventory
- Slow/Uncertain Transport	- High Velocity/Reliable Delivery
- Cumbersome Batch Repair	- Optimum Repair Flow
- Static Processes	- Continuous Improvement
- High Cost	- Reduced Investment
Base Processes:	*Base Processes:*
Large Capital Investment	*Lean Two-Level Maintenance*
- Big Peacetime Operating Stock (POS)	- Smaller Tailored Stocks
- Big Readiness Spares Packages (RSP)	- Streamlined Support Packages
- Big Footprint	- Light Footprint
BOTTOM LINE	*BOTTOM LINE*
- Big Inventory Drives Infrastructure	- Innovations Streamline Infrastructure

Source: HQ USAF/LGM-2

just-in-time (JIT) inventory, Military Overnight Express. The Lean Logistics "Building Chart" in Figure 2 illustrates the relationships.

While a number of other Lean Logistics initiatives are still in varying stages of development, two other Lean Logistics initiatives **already implemented** deserve mention: Door-to-Door Distribution (D³) and Repair and Return Packaging (R²P). You'll recall that LogAir was an integrated system of contract aircraft and trucks established to expedite the movement of reparables to, from, and between Air Force bases and their supporting depots. Budgetary and force structure changes prompted us to look at LogAir's effectiveness. As a result, we established the LOG EXPRESS Tiger Team to study LogAir and its alternatives.

We found that while LogAir costs $116 million annually, D³ costs only $33 million per year! Door-to-Door Distribution uses commercial premium express transportation for high-priority cargo, and surface transportation for routine, hazardous, oversized and classified cargo. In short, D³ is more bang for the buck—it costs less, yet it's more responsive, guaranteed and on-time.

We should evaluate what we do, consider why we do it, assess what it gives us, and determine if the output is worth the input given today's security requirements and resource limitations.

Another key Lean Logistics initiative changing the way we do business is Repair and Return Packaging (R²P). *Implemented in conjunction with 2LM, R²P works to increase the movement velocity of critical spares (high-value, short-supply) by minimizing the number of physical handling nodes, thereby entering the spares into the transportation and repair pipeline sooner.*

In brief, the Air Force adapted the successful business practice of "return labeling," which was pioneered by the mail order industry. This initiative features the proven commercial business practice of pre-addressed return shipment labels. Aside from higher-velocity movement of critical spares, its benefit is that commercial express carriers provide system equipment to create all shipment documentation. Another plus is that no capital investment is required for additional shipment hardware—a double bonus!

The magnitude of change that could potentially result from these and other Lean Logistics initiatives is awesome for some, perhaps intimidating for others. For example, some logisticians may be concerned that with initiatives such as 2LM, base-level operational maintenance is on the verge of extinction. Others may believe that with Base Realignment and Closure Commission-induced Service depot closures, the Services' organic depot maintenance may also be on the wane.

Neither conclusion could be further from the truth since maintenance capabilities in both of these areas will continue to be integral to preserving and enhancing our Air Force's global reach and power—either as a stand-alone capability, or in concert with other Services, joint activities or the private sector. In short, this new era is one in which opportunities for logisticians should be seen as growing...**not** shrinking.

The Challenge to Logisticians: Embrace Innovation

The challenge this new era in logistics poses makes it critical that Air Force **logisticians** chart the course of Air Force logistics in the coming years by encouraging innovation and by leading the effort to implement continuous improvements to business practices and logistics processes.

Does this increasing focus on continuous improvement mean we should **automatically** discard current Air Force business practices and logistics processes? Absolutely not!

Figure 2. The Lean Logistics Building

LEAN LOGISTICS

Business Practices

| 2LM | R2P | M3 | CMOS | EDI | JIT | I2P |

Military Overnight Express (MOE)

Door-to-Door Distribution (D3)

2LM: Two Level Maintenance
R2P: Repair & Return Packaging
M3: Mail-Like Matter Movement
CMOS: Cargo Movement Operations System
EDI: Electronic Data Interchange
JIT: Just-In-Time Practices
I2P: Industry Information Processor

Source: HQ USAF/LGT

General Merrill A. McPeak, USAF (Ret.)

and reduce user costs while delivering a certain level of product quality or capability.

Examples of this latter group might include JIT practices, improved "make-or-buy" decision trees, streamlined commodity management, and flexible manufacturing and repair processes. The point is this: Whether we apply an entire discipline or just one principle, we're only just now discovering our capabilities for improving our logistics practices and processes—and logisticians should be at the forefront of this discovery. But, while this discovery should be unconstrained, it should also be focused—and leadership is the key.

Opportunities for Leadership: The Benefit of Innovation

With the restructuring of our operational wings and reduced defense budgets come great opportunities for logisticians to exercise leadership at all levels by fostering and implementing innovation in every area of logistics. Such leadership opportunities come with the prerequisite to expand one's experience base and develop one's professional skills. Foremost, logisticians achieve this prerequisite

by gaining experience in operational and industrial logistics—at a variety of levels, CONUS and overseas.

Initially, this should be accomplished in one's primary logistics Air Force Specialty Code. However, subsequent experience in other logistics specialties can only enhance one's abilities as a logistician. Why? The answer is that despite change, the kinds of professional credentials we hold as important still remain important—because they give logisticians the tools they need to be innovative leaders in the current and future logistics environments.

The demographics of professional training and civilian education notwithstanding, however, the core message is this: The depth and breadth of an individual's experience is still most important. Second, we can enhance our abilities as military logisticians to better support the Air Force vision—*Air Force people building the world's most respected air and space force – global power and reach for America*—by bringing our military experience, training and education to bear on our profession of military logistics, making sure they all complement each other.

We should evaluate what we do, consider why we do it, assess what it gives us, and determine if the output is worth the input given today's security requirements and resource limitations. Then, if change is needed, we should look everywhere—anywhere—for a better way to do the job at hand and the job we expect to do in the future.

Continuous improvement means studying what works, what doesn't, why, and under what conditions. It may even mean looking to non-traditional sources for answers to traditional problems—something we're increasingly doing. For example, what Air Force logistician would have thought 10 years ago that the commercial mail order industry's "return labeling" business practice would help us develop the R²P concept that we now use to support Air Force weapon systems at reduced cost?

Where do we go for inspiration? What areas are ripe for examination from the macro- and micro-perspectives? Several disciplines and principles are likely sources of innovation affecting Air Force logistics practices and processes. A short list of such disciplines might include industrial engineering or public administration. A likely list of useful principles might be those that increase user control
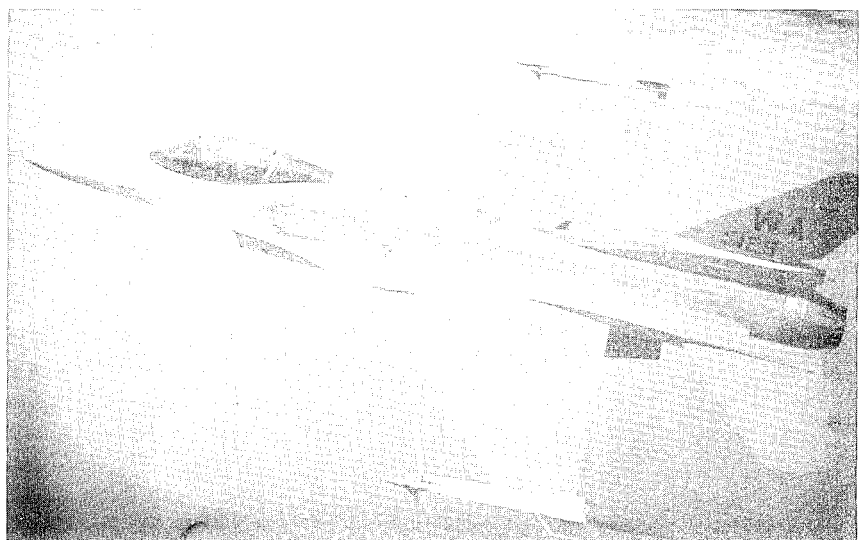
Two-Level Maintenance relieves us from deploying intermediate repair equipment — in an F-16 squadron, more than 100 tons of engine maintenance and avionics equipment. Pictured: F-16C Falcon assigned to the 422d Test and Evaluation Squadron, Nellis Air Force Base, Nevada.

However, we're also discovering through our Lean Logistics efforts that exposure to, and the application of, the civilian educational disciplines and private-sector business practices to the military logistics arena are of growing importance. Perhaps it's this area that offers us greatest promise for continuous process improvements in military logistics. With this in mind, let me share some thoughts expressed by General Merrill A. McPeak, former U.S. Air Force Chief of Staff, at the first Quality Air Force Symposium held in October 1994 in Montgomery, Alabama:

> ...we can't relax. We must remain open to new ideas. We have to make the Air Force better. We can't afford to throttle back and level off—we must always have a good rate of climb. My position is that people should come in every morning saying this is a great place to work, but there's still room for improvement. The Secretary and I expect you to continue pushing the limits of excellence. When others look for an example of a quality operation, we want them to think first of the United States Air Force.

We *do* need to continue to push the limits of excellence, and Lean Logistics is a key means to do so—because it's the **system** of continuous improvements that brings our logistics structure in line with force structure. We also *must* reduce our logistics support costs while keeping, if not enhancing, our support capability. Our challenge: Minimize logistics infrastructure while building and sustaining a ready force.

A concept as powerful as Lean Logistics, however, can't support the level of reductions we'll face in the next few years. As a result, the Chief directed an effort to reduce operations and sustainability costs for our weapon systems. Reductions in ownership costs will likely come from reduced demand and consumption from

Whether we apply an entire discipline or just one principle, we're only just now discovering our capabilities for improving our logistics practices and processes—and logisticians should be at the forefront of this discovery.

the using commands. User efforts like Fast Fix and Gold Flag are important as they reduce demand through the base-level repair of **selected** parts, vice disposing of these parts or sending them back to depots for repair.

Likewise, reduced costs in the support organizations can reduce direct costs of labor and materials, **and** can reduce overhead from infrastructure and personnel. Finally, improved programming from the Air Staff can make our internal procedures more responsive, thereby allowing us to better capture savings from major command initiatives sooner in the budget process.

We *can* maintain our fighting edge **and** live within our budgets if we do these things—smartly. The efficiencies realized from Lean Logistics and comparable concepts will help finance our commitment to our people, our technological edge and our readiness. We must size, structure and manage our logistics resources carefully if we are to continue fielding the world's most respected air and space forces. Through Lean Logistics and our individual and collective efforts, we'll turn this vision into a living reality. As we prepare to enter the 21st century, the opportunity to do so is ours for the taking.

LETTERS TO THE EDITOR

I read with interest the short discussion in the Jul-Aug 94 issue of *Program Manager*, article titled "Insufficiently Robust DT&E Means Trouble Ahead for OT&E" by Raymond Reig, about the Air Force BOLD STROKE program.

The BOLD STROKE Forum on Software Management was originally designed for general officers to increase the awareness of these officers to the impact that software has made to the warfighting capabilities of the Air Force, and the force enhancement increases that software allows. However, this course is not only for general officers. We currently offer three courses per year for general officers and three for colonels and GM-15s.

The BOLD STROKE course was not designed by Defense Systems Management College for the Air Force Systems Command. It was designed by Air University in 1985, at the direction of then Chief of Staff General Gabriel and then Secretary of the Air Force Orr, primarily focused at the operational flag officers. These officers were the ones that appeared, at that time, to not understand the impact that software was/is making to our warfighting abilities. The Forum is not a one-week course; it is two days. The Forum is not conducted by the "Professional Development Institute" (whoever that is), but by the Technology Management School, under the College for Professional Development, under Air University at Maxwell Air Force Base, Ala. Our functional sponsor that we work with on curriculum and speaker selection is Mr. Lloyd Mosemann, SAF/AQK.

Any questions concerning BOLD STROKE can be answered by calling the school at DSN 493-7826, or Commercial (205) 953-7826. We are always interested in good speakers in students that are wanting to learn more about software in the Air Force.

Gerald L. Ourada
Captain, USAF
Course Director

Cadet J. Jeremy Marsh's well-researched, comprehensive and informative article "Liberators, Mustangs and 'Enola Gay'" (*Program Manager*, September-October 1994), evoked some lively memories from my childhood in Germany during WW II. They turn personally extremely unpleasant when recalling a Mustang sortie in September 1944 on a train in the German Saar region. I only survived because one of the pilots chose to make a slight turn to the left, which made the spray from his outer right machine gun pass about a yard from me.

Mustangs were particularly feared by the Germans because of their low-altitude capability, high firepower and low engine noise level. As for the Liberators and Flying Fortresses, we used to count them, by the hundreds, in the bright and sunny sky as their groups and wings were heading in undisturbed, parade-like formation, toward yet another carpet bombing target in Germany.

Up to the summer of 1943, their flight path was quite often accentuated by the white puffs of German 88mm flak shells exploding harmlessly at their maximum effective range, about 500 to 1,000 meters below their unreachable targets. By the time the Germans had gotten around to fielding the longer-range 127mm antiaircraft gun, American bomber design had already accounted for this new threat by extending the bombers' altitude capability, propulsion power and armor protection.

I feel this article is of considerable value from the viewpoint of acquisition management, specifically as concerns requirements-based rapid design management, and user-developer-industry interaction. It is also an excellent study in military history, focusing on what I consider to be the decisive aspect in the outcome of WW II.

Hermann O. Pfrengle
Honorary International Professor
Multinational Program Management

THE PROOF IS IN THE PACKAGING

An Essential Element of the DoD Logistics System

Richard S. Cunningham

The *American Heritage Dictionary of the English Language* defines logistics as "the procurement, distribution, maintenance and replacement of materiel and personnel." The DoD logistics system is much more than this.

In addition to the procurement, distribution, maintenance and replacement of materiel and personnel, the DoD logistics system also includes, but is not limited to, the disciplines of packaging, handling, shipping, storage and transportation. Its primary mission is to provide the soldier, sailor and airman—the ultimate users—with what they need, when they need it and where they need it, and to provide it in a usable configuration and condition.

A Vital Role

The role of packaging is to afford protection against physical damage and environmentally induced deterioration. Moreover, packaging must provide this protection within a context of unknown and varied conditions that exist in the handling, storage and transportation network.

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Packaging design must facilitate these handling, storage and transportation conditions and must provide for a means of inspecting and maintaining the materiel while in storage. Packaging personnel must be responsible for the safety, health and environmental impact of their decisions. They must be responsive to the needs and concerns of society as well as to the needs and concerns of the military personnel they serve.

Mission-Essential

All of this makes packaging sound pretty important, doesn't it? Well, the truth is that packaging is a vitally important and essential element in the logistician's periodic table. If one of the other logistical elements fails such as shipping or storage, service members can still function for an extended period of time. However, if the element of packaging fails, they may not be able to function at all.

What would tank crew members do if they found that their gun tube barrels were corroded because someone failed to apply the required preservatives? Or what would service members do if they couldn't get a canteen of drinking water because someone failed to properly preserve or pack the water purification equipment? Many more examples could be cited, but they would all invariably have a negative result.

The bottom line is that even though packaging is vitally important to our
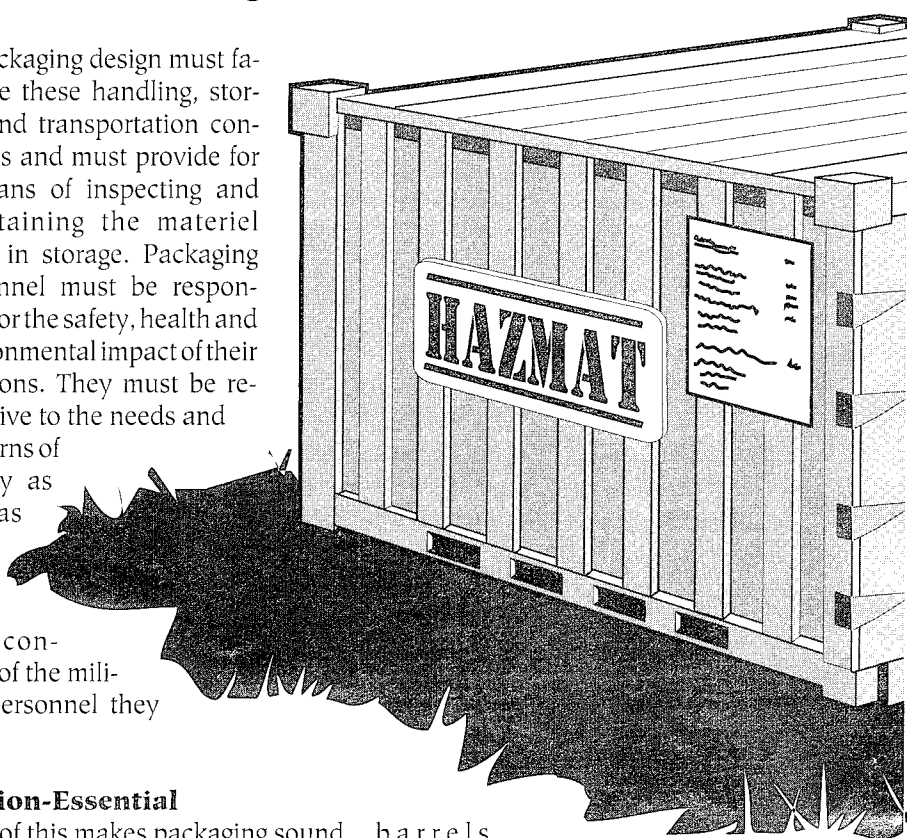
success, most of us take it for granted. We don't think about it until something is received broken or corroded, or just doesn't work. That's when "the proof is in the packaging" becomes reality.

In the past, packaging was considered by many to be merely something that was nice to have—not mission-essential. If a commander had extra money to spend, he would rather buy an additional squad tent or extra field tables than buy a heat sealer or a pallet load of fiberboard boxes. Maybe that was okay 10 years ago, but it's not okay now.

Packaging for the Future

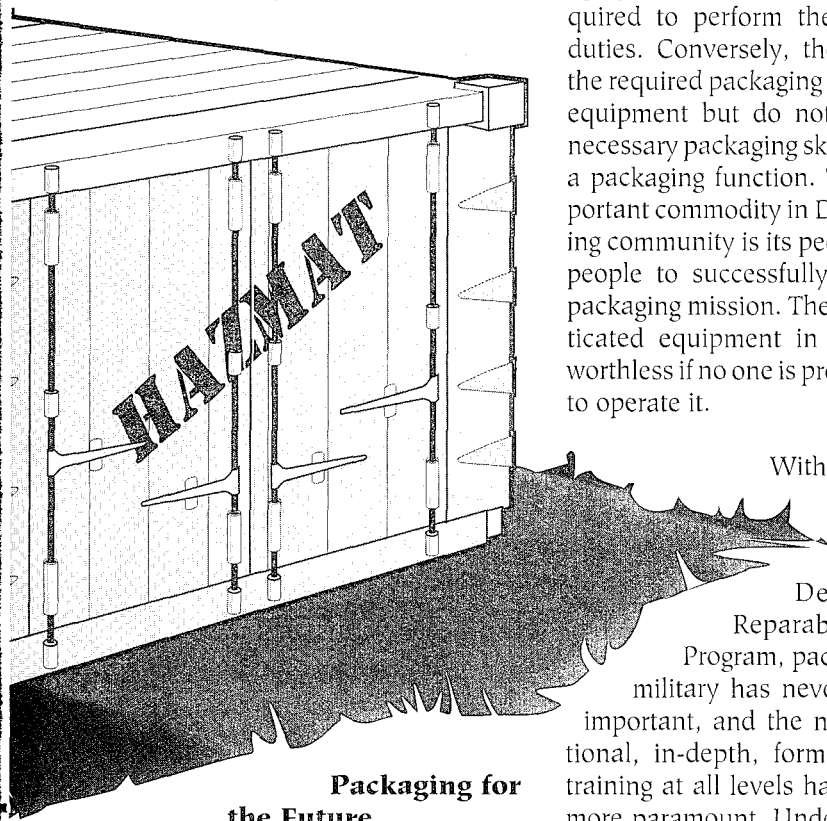As the terms "downsizing, drawdown, reorganizing and base closure" become part of our everyday lexicon, we are faced with the reality of having to do more with less. This realization is never more evident than in the field of packaging.

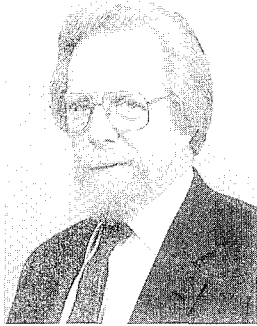The dollar value of materiel returned from Desert Shield/Desert Storm that was ruined because of improper or inadequate packaging protection may run into the hundreds of millions of dollars. Recent studies showed decisively that depot-level reparable materiel returned for repair was often damaged or degraded as a result of improper or inadequate packaging or processing. Because of packaging's vital role in our everyday operations, military and civilian DoD personnel who process and pack materiel must be sufficiently trained if this negative trend is to be reversed.

Packaging personnel often find themselves in a Catch 22 situation. They may possess the necessary packaging skills, but do not have the packaging materials and equipment required to perform their packaging duties. Conversely, they may have the required packaging materials and equipment but do not possess the necessary packaging skills to perform a packaging function. The most important commodity in DoD's packaging community is its people—it takes people to successfully perform the packaging mission. The most sophisticated equipment in the world is worthless if no one is properly trained to operate it.

With DoD's implementation of the Stock Funding of Depot Level Reparables (SFDLR) Program, packaging in the military has never been more important, and the need for additional, in-depth, formal packaging training at all levels has never been more paramount. Under the SFDLR Program, units will receive a percentage of credit when they turn in serviceable and unserviceable materiel. The amount of credit received will be predicated on the condition of the materiel when it arrives at the servicing depot. When the SFDLR is fully implemented, the careless identification, packaging and transporting of reparables will directly cost units from their stock funds. Some type of formal packaging training, therefore, is imperative for all military and civilian

Dr. James E. Price became the new Dean, Research, Consulting and Information Division, effective 9 January 1995. He previously served as a Chair, Integrative Program Management Department, Faculty Division.

Jim joined the faculty of DSMC in January 1992 and holds an A.A. in Management, University of Maryland, 1972; a B.S. in Business, University of Maryland, 1974; an M.S. in Business, Central Michigan University, 1976; and a Ph.D. in Public Policy (Science and Technology Policy) from George Mason University, 1993.

personnel who perform a packaging function.

In our continued efforts to do more with less, we must better utilize our resources, including our personnel. As the DoD moves toward a smaller, quicker, more mobile military, and as the role of packaging becomes more critical to its success, the need for trained packaging personnel has never been greater. We must now make the funds available for formal packaging training at all levels. We cannot wait for later. **LATER IS NOW!**

AMERICA'S ERODING CRITICAL TECHNOLOGY BASE

A Program Management Concern?

Lt. Cdr. Steve Eastburg, USN

The six weeks of Desert Storm dramatically drove home a vital fact that the U.S. seemingly failed to appreciate fully in the four decades spanned by the Cold War. This nation is becoming alarmingly dependent upon foreign sources of technologies critical to our most sophisticated weapons systems. While the warning signs were there for some time, the Gulf War dramatically highlighted the problem of foreign technology dependence.

The Framework for Concern

Of interest is the fact that this condition surfaced despite the spectacular performance of America's sophisticated weaponry. Much of the success of these weapons must be attributed to a vast array of system components developed and manufactured by overseas competitors. Among this long list were such items as optical glass used in reconnaissance satellites, manufactured in Germany; gallium-arsenide semiconductor chips found in satellite and radar receivers from Japan; and five different parts of the Abrams tank, including the gunner's

sight optics and an ingredient in the seal, which were also made by overseas companies.[1]

The extent of this nation's foreign dependence cannot be precisely quantified. What is known, however, is that there no longer exists any major U.S. producer of robots. Overseas investors also acquired the last major American manufacturer of silicon wafers, a component critical to production of semiconductors. This country also lost its lead in the manufacture of supercomputers, optoelectronics, semiconductors, digital imaging, and in dozens of additional critical technologies.[2]

Numerous government reports over the past several years warned of the erosion of U.S. industrial competitiveness. A 1990 Commerce Department study reported that this country lost competitive advantage to Japan in all but three of 12 key technologies.[3] That the potential loss of control over these advanced technologies portends deleterious impact upon a broad range of industrial capabilities is widely recognized.

Generally, with the loss of technologies also flows a diminished job base, lost national income and prestige, a lowered standard of living, lost market share, and an increased trade deficit. Loss of control also places the U.S. in the situation where overseas competitors could raise prices or even withhold
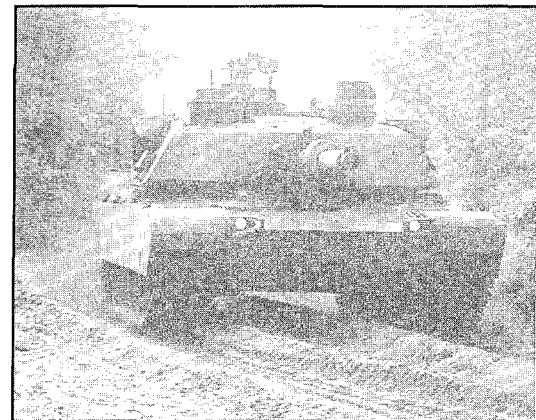
A

products to enhance the financial standing of their own industries.[4]

The implications of a nation's forfeiture of its technological competitiveness are fairly well known in an economic sense. However, the impact upon national military security, an arena where the stakes are even higher, is less well understood. According
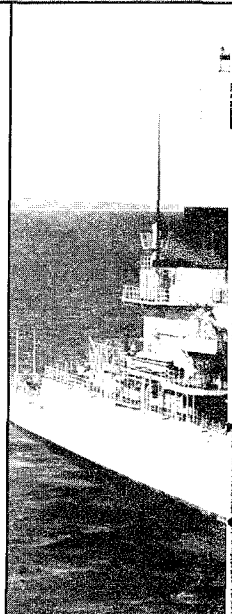
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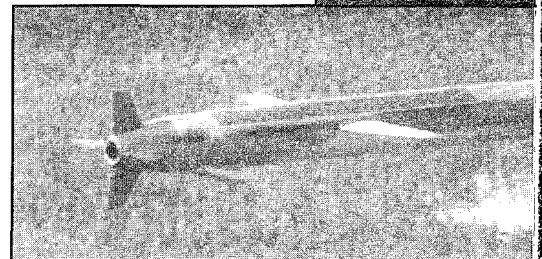
Lt. Cmdr. Eastburg serves as Project Officer, Tomahawk Program Office, Program Executive Officer, Cruise Missiles Project and Unmanned Aerial Vehicles Joint Project, Crystal City, Virginia. Cmdr. Eastburg was a member of PMC 94-1.

to a 1991 Defense Science Board assessment, the U.S. military was "dangerously dependent" upon foreign suppliers for spare parts and technologies critical to operating many weapons systems.[5] A 1991 report from the Office of Technology Assessment noted that "almost all U.S. weapon systems contain component parts from foreign sources."[6]

During the Gulf conflict, many U.S. military commanders found that even with significant cooperation from foreign governments, existing dependence upon overseas suppliers greatly complicated the efficient flow of logistics supplies to U.S. forces in the field. This situation also raised concerns among many senior U.S. policy makers about how to ensure future combat readiness in the event that this country would encounter shortages of components from non-cooperative overseas suppliers during future conflicts.[7]

The Program Manager's Dilemma

It appears obvious why an issue such as foreign technology dependence might capture the interest of and invite speculation from economists, international traders, and perhaps even national security specialists. But why should such a macroeconomic and trade concern be of even remote interest to military program managers (PM)? The answer to this important question lies in recognizing and understanding the degree to which programs rely on foreign sources for critical technologies and parts support. The answer also resides in appreciating the PM's responsibility, as detailed in governing acquisition regulations, to consider the impact of programmatic decisions upon the defense industrial base.

It might be of value to review what existing guidance is provided in the applicable acquisition instructions. DoD Instruction (DoDI) 5000.2 (Part 5, Section E) states the following:

Plans and actions must ensure that adequate industrial capability exists to produce, in an efficient and cost-effective manner, the goods and services required to meet DoD missions...

The DoD Federal Acquisition Regulation Supplement (DFARS) also has something to say about responsibilities that government PMs shoulder in addressing the national technology and industrial base. Part 207 (Acquisition Planning) specifically states that major defense acquisition program planning must address the following areas:

• An analysis of the capabilities of the national technology and industrial base to develop, produce, maintain and support programs, including consideration of the following factors related to foreign dependency:

— Identification of items that are available only from sources outside the national technology and industrial base if such items become unavailable from sources outside the national technology industrial base.

— Analysis of any military vulnerability that could result from the lack of reasonable alternatives.

• The effects on the national technology and industrial base that result from foreign acquisition of firms in the United States.
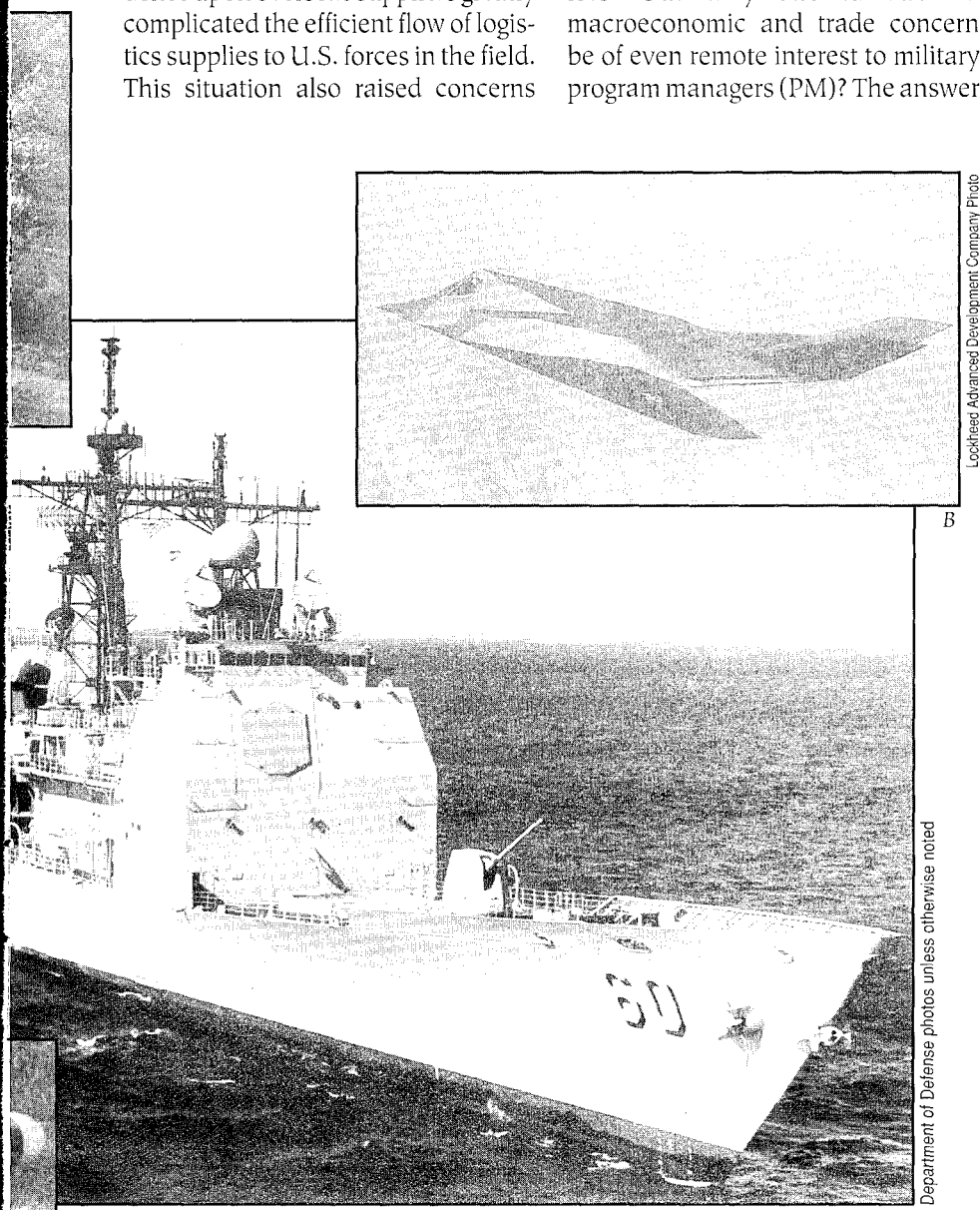
A. M1A1 Abrams Tank
B. F-117A Stealth Fighter
C. U.S. Navy Tomahawk Cruise Missile
D. USS Normandy (CG-60)

Lockheed Advanced Development Company Photo

Department of Defense photos unless otherwise noted

Because of the acknowledged difficulty and arcane nature of attempting to forecast industry activity, particularly those aspects involving corporate acquisitions and mergers, viability of the defense industrial base has not always represented an area of concentrated attention from PMs. Nevertheless, political, military, economic and social pressures will increasingly compel program offices to direct attention to the impact upon their programs of America's migrating, and in some cases eroding, defense industrial base. The question that ultimately arises, then, is what steps can be taken to influence and respond appropriately to the dynamics of this changing technology marketplace?

The Way Out

From the vantage point of the typical program office, seemingly little overt influence can be brought to bear in meeting the national challenge of reinvigorating America's diminishing high-technology market share. Nevertheless, a coordinated response to guidance contained in DoDI 5000.2 and DFARS Part 207 will provide some modicum of insurance against inadvertently designing a system containing potentially insupportable foreign technology or components.

In considering tradeoffs among competing technologies, PMs would be advised to insist upon the development of system architectures containing technologies and components that are projected to be continuously available over the system's entire life cycle. In support of this design approach, efforts should be initiated to make available to the defense systems acquisition communities a database that details the status of various critical technologies.

This database could be used to track those technologies and specialized components that are either exclusively held by foreign concerns, or are in danger of achieving that status. Likewise, the database would enable government and contractor PMs to make prudent choices in identifying the technologies that they project as available for inclusion in developing systems, and that they estimate as supportable in the out-years of a system's life cycle. Similarly, the database would enable program offices to steer the design of their systems away from a dependence upon technologies that are in danger of being fully acquired by foreign interests.

Within the bounds of what makes good economic sense, the government should place an emphasis upon rewarding companies for automating their manufacturing plants. Likewise, firms should be compensated for retaining critical organic production capabilities, as opposed to contracting-out for various specialized manufacturing processes. These corporate capabilities could be considered during the source selection process, as well as during other contract award and administration activities.

Any U.S. corporations with contracts for critical weapons systems that are not presently doing so would be advised to identify alternate manufacturing materials and processes, including those that are readily available from American producers. Defense firms, of course, should maintain a healthy vigilance of the status of their suppliers, and should remain cognizant of industry forecasts of the availability of existing critical materials. Companies should also continuously seek to identify materials and processes that could be substituted for those presently employed. This effort should be undertaken not simply with the objective of reducing current unit production costs, but also as a hedge against incurring inflated costs as a result of a future takeover of a supplier by an overseas investor.

The prospect of diminished military preparedness arising from emigration of selected technologies from the U.S. is a topic of intense public debate. Ultimately, the debate will come home to roost in the backyards of the military-user communities, which will be held accountable for supporting and maintaining systems in operational environments. The PM's responsibility to the user community demands proactive involvement in comprehensively addressing the various impacts upon a system of technology migration.

As the trend of foreign acquisition of American high-technology companies continues, military PMs will likely encounter increasingly formidable challenges developing systems that are not over-reliant upon critical technologies owned exclusively by overseas companies. Only by directing careful consideration to the source and supportability of components selected for inclusion in developing weapons systems, will PMs be assured that available and affordable life-cycle support of these systems will exist well into the future.

Endnotes

1. Pollack, Andrew, "In U.S. Technology, a Gap Between Arms and VCRs," *New York Times*, March 4, 1991, p. D8.
2. Tolchin, Martin and Susan, *Selling our Security: The Erosion of America's Assets* (New York: Alfred A. Knopf, 1992), p. 5.
3. U.S. Department of Commerce, *Emerging Technologies: A Survey of Technical and Economic Opportunities*, Spring 1990, p. 13.
4. Tolchin, p. 4.
5. Department of Defense, *Report of the Defense Science Board Study of the Defense Industrial and Technology Base*, October 1988.
6. U.S. Congress, Office of Technology Assessment, *Arming our Allies: Cooperation and Competition in Defense Technology*, May 1989, p. 5.
7. O'Rourke, Ronald, Congressional Research Service, *Persian Gulf War: Defense Policy Implications for Congress*, May 15, 1991, p. 71.

"US VERSUS THEM" ATTITUDE IMPROVES AFTER COURSE

DSMC Gaming in Classes Offers an Open Environment for Sharing Ideas

Vincent P. Grimes

Walking into a class at the Defense Systems Management College (DSMC) to see Pentagon acquisition professionals and industry managers building toy pup tents makes one wonder how effectively public money is being spent. Seeing acquisition managers sitting around a table rolling dice and moving poker chips from one place to another also may raise eyebrows.

There is a method to this madness at DSMC. Professors blend hands-on activities with lessons on manufacturing principles and management philosophies. According to those attending courses, this teaching style is more interesting, informative, and leaves a stronger impression than training programs regarded by participants as "death by viewgraph." Classes are not exercises in learning how to fill out forms.

Professors make it clear the purpose of classes and the College is to educate. The goal is to teach students to understand general acquisition management principles. Students, however, come to courses with some preconceived notions. When courses begin, clearly they have one primary objective — certification as acquisition corps professionals.

Ticket Punching

Attending courses is "ticket punching or having the right box checked off in the personnel folder,"according to one professor.

Mr. Grimes is currently the Senior Writer, National DEFENSE magazine. He initially wrote a similar article describing his experiences as a former DSMC graduate of the Level II Defense Manufacturing Management Course (DMMC). When the Course Director, Lt. Col. George A. Noyes III, spotted the article in National DEFENSE magazine, we contacted Mr. Grimes for a follow-up. The course is now offered at the Air Force Institute of Technology (AFIT).

Another gives a similar view: "Some government students consider a DSMC course an unwanted diversion from their jobs."

During the courses, attitudes and prejudices change. The teaching environment and the classroom interaction are responsible in large part for the altered mindset.

A reason for the changing attitude is the College's longstanding policy of non-attribution for speakers, professors and students. The policy promotes an environment for the free and open exchange of information and ideas. The students say the ability to speak freely and provide personal experiences enriches the class.

Another factor in the shifting attitudes is the student mix. In each course, approximately seven percent come from industry. The remainder are military and civilian professionals from often competing Army, Navy, Air Force and Defense Department agencies.

Some tension and a bit of surprise are evident when the military's acquisition students discover several of their classmates come from industry. The adversarial relationship that has developed between the two groups is initially evident.

In discussions with professors, it becomes clear that bringing together people from government and industry serves a vital function. As courses progress, the interaction between the students leads to a better understanding of the interrelationship between all the parts of the acquisition, development and manufacturing process.

Attitude Change

Brig. Gen. Claude M. Bolton, Jr., USAF, DSMC Commandant, says his perception before taking a course at the College was that "industry was out to take advantage of the government." However, the students from the defense industry and the College

helped change his attitude. "At the end of the course I realized that you depend on contractors, and they are honest people trying to do the best they can in a complex atmosphere," Gen. Bolton recalls.

Classes also provide opportunities for Defense Department representatives at commercial manufacturing plants to discuss acquisition policy issues with their colleagues involved in program management and contracting.

A point made throughout the courses is understanding the relationships between a system's cost, production run and performance characteristics. The basic economic law of decreased production rates causing a rise in the per unit cost is mentioned at every opportunity.

Transitioning from prototype construction to full-scale production is also a challenge acquisition professionals must be prepared to meet. The realization that the use of a low-rate initial production phase does not always reduce program uncertainties when part of an acquisition strategy is driven home by case study reviews. Ultimately, understanding acquisition principles and programmatic challenges provides a framework in which changes in acquisition regulations and new environmental requirements can be placed.

World-Class Customers

The military can no longer afford to maintain a separate defense industrial base regulated by more than 30,000 military specifications and standards. The fast-paced cycle of technological change is also forcing the military to use commercially developed systems.

Defense Secretary William J. Perry mandated the use of commercial specifications, such as the ubiquitous ISO-9000 standard, for new acquisition programs. He also encouraged the purchase of commercial off-the-

shelf systems, where appropriate. Secretary Perry's goal is to make the Defense Department a world-class consumer.

Many students do not understand the commercial ISO-9000 standards program. Since its importance will grow as commercial specifications replace military standards, classes are made aware of ISO-9000's broad provisions. The College is adjusting its course curriculum to pay additional attention to commercial standards and off-the shelf procurement.

Besides attempting to become world-class customers, the Pentagon's acquisition workforce is becoming more aware of environmental protection issues. The growing importance of environmental regulations is evidenced by a substantial chunk of one day's instruction being devoted to the topic.

Not understanding environmental laws can have dire consequences for program management. Students discuss their own horror stories of having to deal with conflicting environmental laws, regulations, and the advice of superiors and legal counsel. The growing number and complexity of laws covering manufacturing, handling and disposal of toxic materials presents a challenge to the acquisition corps. Program managers can be held personally liable for violations of environmental regulations.

Gaining an understanding of commercial standards and environmental regulations are just two examples of how DSMC courses teach students and help change their attitudes. As we enter an era of intense acquisition reform and streamlining, cooperation between government acquisition personnel and industry representatives will take on added emphasis. In this area, the College is at the forefront, daily teaching students to better understand the acquisition, development and manufacturing processes as seen from each other's perspective.

A DECADE OF SUCCESS AND FAILURE IN THE DOD ACQUISITION SYSTEM

A Continuing Quality Journey

Raymond W. Reig

A recent research effort identified the current "track record" of Department of Defense weapon systems acquisitions. In the spring of 1993, the office of the Director of Operational Test and Evaluation (DOT&E), asked DSMC to undertake a research study of the current DoD acquisition system for a very specific reason.[1] Since 1991, Congressional law requires the DOT&E to specify at Milestone II, the number of test articles required for the Initial Operational Test and Evaluation in the Army and Air Force, and Operational Evaluation in the Naval Services (IOTE/OPEVAL) system test. The office desired to know if there was historical data that would help in making this important, and possibly costly decision.

(**Editor's Note**: In the July-August issue of *Program Manager*, Professor Reig commented on the acquisition of software-intensive systems. This article reviews the acquisition history of 24 recent programs of all types.)

Professor Reig is on the faculty at DSMC. He is a graduate of the U.S. Naval Academy, New York University, Auburn University, Southern Illinois University, the Air War College and PMC 90-1.

FIGURE 1. Results: Ratio of Actual vs. Planned
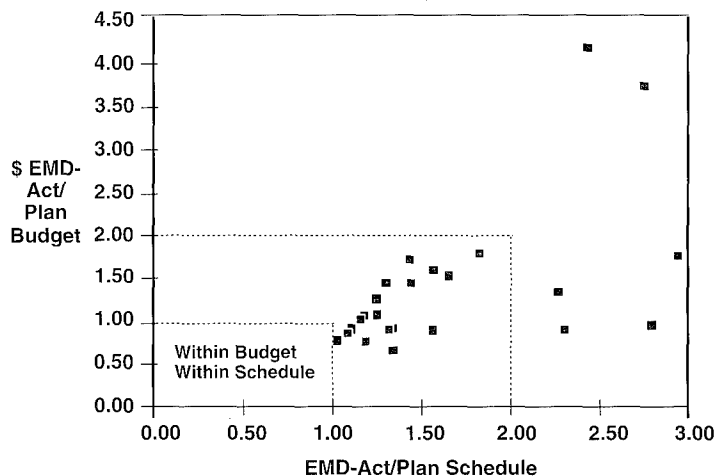
Engineering and Manufacturing Development Phase

Because the acquisition phase of interest was the Engineering and Manufacturing Development phase (EMD), we concentrated our efforts on this phase exclusively. We surmised that if we reviewed the data within the "Blue Books" prepared for Defense Acquisition Board (DAB) meetings at Milestone II and Milestone III, we could determine the program's success in adhering to its EMD phase. "Blue Books" are summary program plans and data compiled for the use of DAB principals and staff assistants immediately prior to milestone meetings.

Milestone II DAB information gave us the program's planned activities and expenditures. The Milestone III DAB information gave us actual activities and costs incurred during EMD. We were particularly interested in the planned and actual costs for EMD, and the planned and actual schedule. To gather this data, we also looked at the annual Selected Acquisition Report (SAR) for the year the program conducted its Milestone III DAB meeting.

We applied this approach to 24 recent DoD acquisition programs. As we reviewed the DAB "Blue Books" and program SARs, we recognized that we could extract much more information than was necessary to answer the basic question:

Is there a relationship between the number of Low Rate Initial

Production (LRIP) articles used for testing in EMD/IOTE/OPEVAL, and the success of that program?

Also, we intuitively assumed that LRIP quantity alone could not account for the success of any program in EMD. We identified six other variables that could affect a program during EMD and gathered this data as well.

The net result of this approach is that we gathered data from the EMD phase that —

1. determined how successful these 24 programs were in meeting their planned EMD cost and schedule;
2. determined the relationship between LRIP test quantities and program success; and
3. identified how other variables affected program success.

EMD Cost and Schedule Data

Figure 1 indicates the results of planned and actual EMD cost and schedule data for the 24 programs. This is the ratio of the actual EMD results to the planned figures for cost and schedule. A program that came in essentially on-cost and on-schedule, would have a ratio of 1:1 for cost and 1:1 for schedule. Of the 24 programs, 18 came in under a 100-percent cost and schedule overrun (ratios 2:1, and 2:1). For the entire 24 programs, the average cost overrun in the EMD phase of the program was 45 percent, and the average schedule overrun was 63 percent. The data showed more programs were better able to control their cost overruns than their schedule overruns. For the remainder of this article, and for the final research report, we discuss the data obtained by reviewing all 24 programs, unless otherwise noted.

LRIP Test Quantity

Figure 2 shows the results of the data gathered to answer the question of whether the quantity of LRIP test articles was related to program success. (Here program success was de-

fined as a low schedule overrun.) We are dividing the number of the LRIP test articles used within a program by the total planned production quantity, expressed as a percentage. This is compared to the probability of the program having an EMD schedule slip less than 50 percent. These data (21 programs) show that programs using three percent or more LRIP test articles historically never exceeded a 50-percent schedule slip, and the probability steadily increased as the three-percent mark was approached.

The data also show that 28 percent of the total LRIP quantity was acquired with research, development, test and evaluation funds and presumably used for testing. The remaining 72 percent was presumably used for other than test purposes.[2] Proving out the manufacturing process and ramping up the production rate are the only other authorized purposes of LRIP systems. Since this is accomplished regardless of the end use of the LRIP systems, a question could be asked:

Is the current 28-percent LRIP test usage/72 percent other than test usage the proper mix of LRIP systems?

In this regard, a recent Naval Postgraduate School thesis concludes that the majority of the problems that occurred during IOTE/OPEVAL are directly related to test resource issues.[3] It also recommends "sufficient test articles should be produced and available well before the operational test is supposed to start."

Evaluation Scheme

Further, in order to evaluate the impact of the other variables, we devised a standard program success rating scale of one to five. Five indicated the program was "Very Successful," essentially on planned budget and schedule. A rating of four indicated the program was "Successful," exceeding the EMD budget by less than 30 percent, and exceeding the schedule by less than 12 months. Three indicated a "Fairly Successful" program, exceeding the budget by less than 45 percent, and the schedule by less than 18 months. The two lower success ratings decrement by 15 percent for budget overruns and six months for schedule overruns.

It is important to recognize that our evaluation scheme is a measure of program management success at a point in time rather than eventual weapon system success. There was no attempt to evaluate the effectiveness of the systems in their operational roles. Also, we did not evaluate the performance (Effectiveness and Suitability) of these programs in EMD, although that would be an excellent additional study and relatively easy to do.

The six other variables selected were —
1. the degree of risk identified at Milestone II;
2. use of competition during the

FIGURE 2. LRIP Test Quantity and Schedule Slippage

LRIP Test Articles / Total Planned Production Quantity = Percentage
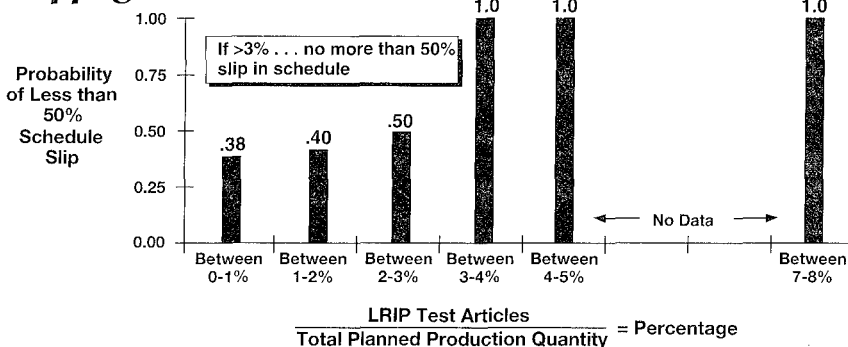
Demonstration/Validation (DEM/VAL) phase;

3. use of competition during the EMD phase;

4. type of contract;

5. number of associate contractors; and

6. Joint- or single-Service program.

From the data available in the program "Blue Books" or the SAR, we assigned a success rating of one to five in accordance with the plan outlined above. We next compared this rating with the program's other variables. For example, did the program at Milestone II indicate it was low-risk or medium-risk?

Program Success Rating Results

Finally, we averaged the program success ratings of the programs that were low-risk and the programs that were medium-risk, and found in this instance, programs that were medium-risk had a higher average program success rating than programs that were low-risk. Initially we assumed a low-risk program would have a better probability of success than a higher-risk program. The data did not support this assumption. Programs that evaluated their risk as Low at Milestone II had an average program success rating of 2.4 as compared to programs with a risk evaluation of Medium, which had an average success rating of 3.3.

Ten programs had no summary risk estimate that we could find. Only one program indicated Software Lines of Code, an accepted metric of software risk. Programs that did not use competition in DEM/VAL had a higher program success rating than did those that did 3.3 vs. 2.0. Programs that did not use competition in EMD also had a higher success rating — 3.1 versus 2.2. We evaluated four EMD contract types, and the data resulted in the following program success ratings: Cost Plus Incentive Fee, Fixed Price Incentive and Firm Fixed Price — all 3.3; Cost Plus Award Fee — 1.0.

The data also showed that programs using one or no associate contractor (besides the Prime) had a success rating of 3.4 compared to a rating of 2.4 for the programs that used more than one associate contractor. For probably the same organizational complexity reasons, single-Service programs had an average success rating of 3.0 compared to Joint programs' success rating of 1.8.

Conclusions

To conclude by returning to our initial paragraph—how are we doing? Well, it depends (a classical phrase here at the College). It depends on what DoD weapon systems acquisition is compared to. Our overall averages were discussed herein, but Figure 3 shows major weapon systems as compared to other industries.[4] Here the comparison is more favorable. And if we return to Figure 1, and consider only the 18 of the 24 programs reasonably clustered together, the average cost overrun is 20 percent, and schedule overrun is 32 percent. These are credible numbers and much better than the 45 percent and 63 percent overall overruns.

In Total Quality Management terms, our performance with 18 of the 24 programs reviewed can be thought of as our current statistical process control bounds for DoD weapon sys-

tems acquisition. "Control charts are simple devices used to establish bounds on measured characteristics, so that when the bounds are exceeded, production should be suspended and the machine in question should be adjusted or repaired."[5] Hopefully, these data define our current baseline on our continuing quality journey.

References

1. Gailey, C. K., Reig, R. W. and Weber, W. (1994); Ongoing, unpublished DOT&E-sponsored research of DoD acquisition, Defense Systems Management College, Fort Belvoir, Va.

2. Reig, R. (1994 July-August), "Insufficiently Robust DT&E Means Trouble Ahead for OT&E," *Program Manager*, Vol 23, No. 4, pp. 12-15.

3. Mills, J., "An Analysis of Weapon System Readiness for Operational Testing," Masters Thesis, Naval Postgraduate School, Monterey, Calif., 1994.

4. "Final Report to the President" by the President's Blue Ribbon Commission on Defense Management, *A Quest for Excellence*, Appendix, p. 61, June 1986.

5. Bailey, M., Bowden, J. and Callahan, A.J., "Managing Ship Performance of Naval Gunfire Support Using Statistical Process Control," *Military Operations Research Journal*, Vol. 1, No. 1, Summer 1994, Alexandria, Va.

FIGURE 3. Cost Growth in Major Projects (RAND)
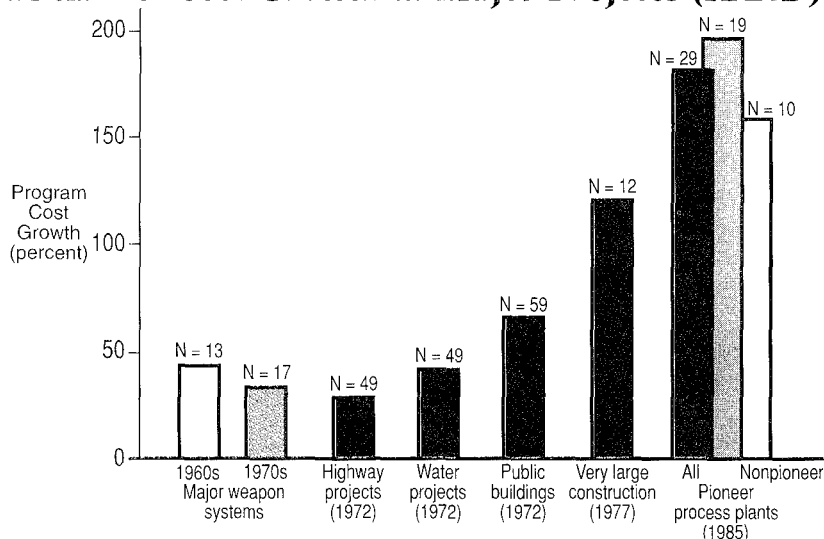
Source: "Improving the Military Acquisition Process — Lessons from Rand Research," (R-3373-AF/RC) The Rand Corporation, 1986.

THE RIGHT STUFF - REVISITED

A Competency Perspective of Army Program Managers

Capt. Bryan J. Mc Veigh, USA

What are the characteristics that distinguish the most successful program managers from their peers? One of the most extensive studies of successful program managers — *The Right Stuff: Results of DSMC Program Manager Competency Study* — identified 16 competencies in its Program Manager Job Competency Model.[1]

This 1989 DSMC study defined a competency as an attribute of a program manager that underlies effective performance. Specifically, the DSMC Program Manager Job Competency Model included 10 core competencies for program managers, and six competencies that distinguished the most successful program managers.[2]

This article presents the results of research recently completed at the Naval Postgraduate School, which evaluated the competencies identified in the original DSMC study from the perspective of the Army's current major acquisition program managers.[3]

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Coaching — senior officers must coach junior officers to reach their potential.

The results of this study are based on survey data obtained from program executive officers (PEO), program managers and acquisition students. Administered to over 220 acquisition personnel, the survey elicited a response rate of 80 percent. The survey asked each respondent to review the 27 competencies from the original DSMC survey. They were then asked to select the nine most important characteristics of the "ideal" program manager, and the nine least important characteristics.

Initially, surveys were administered to Army PEOs and their deputies. These individuals were asked to identify those program managers who best characterized the competencies they had previously identified as most important for an "ideal" program manager. Of the 34 Army program managers, they selected 18 as "successful" and 16 as "average."[4] Of the 25 program managers who responded to the survey, 11 were successful, and 14 were average. Figure 1 reflects the results of the data obtained from both successful and average program managers.

Program Manager Competencies

The Naval Postgraduate School (NPS) study validated 14 of the 16 competencies identified in the original DSMC study. Figure 2 provides a comparison of the original and revised Job Competency Models.

The results of the NPS study indicate that all program managers share 11 competencies. Additionally, five competencies appear to distinguish the most successful program managers. In order to gain further insight into why and how these competencies were ranked, the seven successful program managers, who were se-
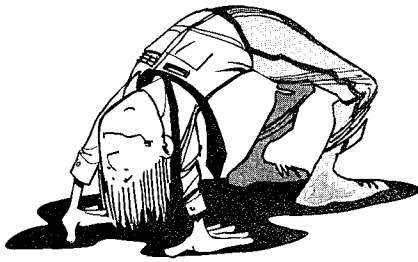
Self control — treat people with decency, and they will bend over backwards for you.

FIGURE 1. Program Manager Competency Interval Scale

lected by more than one PEO, were interviewed. The 16 competencies from the revised Job Competency Model, their definitions, and insights gained from these interviews are provided below. (Note: An asterisk (*) indicates the competencies that distinguished the most successful program managers from their peers.)
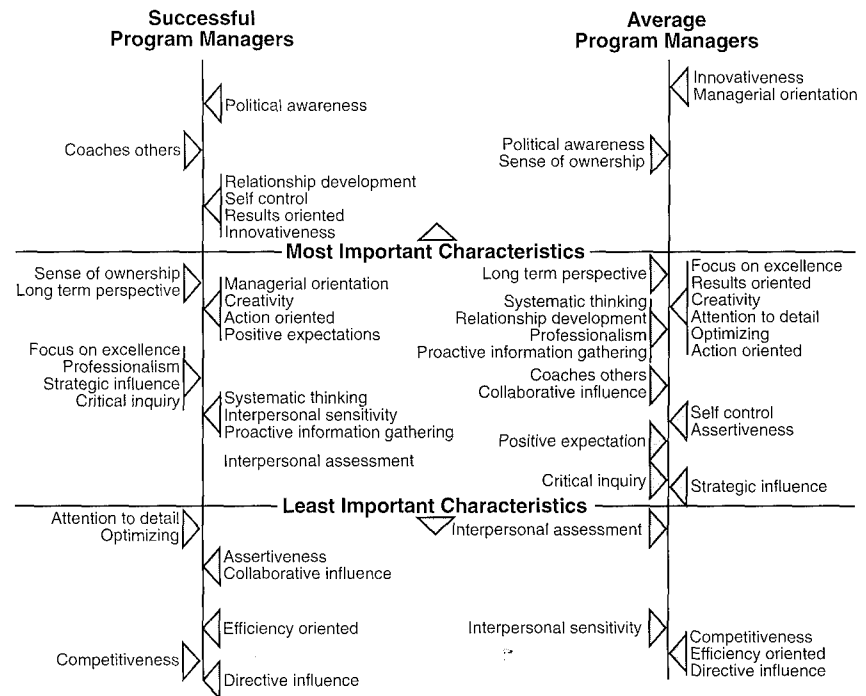
Competency No. 1

Political Awareness: Knows who influential players are, what they want, and how best to work with them. Politics affects every aspect of an Army program. Whether this is right or wrong, program managers must operate in this environment. As one program manager remarked:

> If you are not politically astute about the Pentagon, Congress or other Government agencies, you will never understand their agenda, your program will fail, and you will never know why it failed.

Program managers learn very quickly how politically sensitive their programs are. Of importance for program managers to understand is the fact that trade-offs have been made at the Army, DoD and Congressional levels just to keep their programs viable. As one program manager stated:

> You may have to concede many times on small issues just to keep your program alive; lose the battle to win the war.
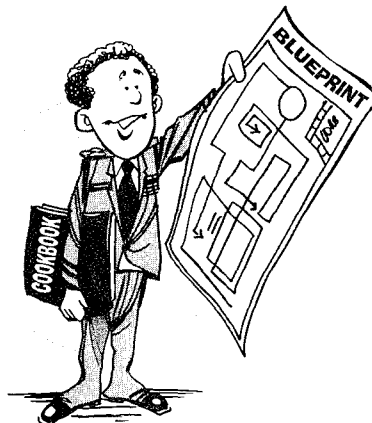
Competency No. 2

Coaches Others (*): Providing others with performance feedback and suggestions to improve their capabilities. As the Acquisition Corps evolves into a profession, the ability of junior officers to learn from their superiors will help them avoid many of the mistakes of the past. If program managers do not train the people who will one day fill their positions, they are performing a disservice to the Acquisition Corps, the taxpayer and the individual. As one program manager stated about one of his junior officers:

There are no cookbook solutions, only plans.

This guy is going to be a program manager one day; it's my job to coach him and let him develop to his potential.

Competency No. 3

Developing Relationships (*): Spends time and energy getting to know program sponsors, users and contractors. A program manager has daily interface with a variety of people from outside his organization. Each of these people will have their own agenda, priorities and resource constraints. To be successful, program managers must be able "...to pick up a phone, explain what [they] need done, and because of the relationship [they have] established with these folks, expect a response."

Building relationships does not happen overnight. Program Managers must take the time to visit and cultivate old and new relationships with key personnel affecting their programs. These key personnel include people from the Pentagon, the test community, contractors and the user. Many program managers stated that they obtained positive results for their programs merely by working the

The PM is the program's number one advocate and cheerleader.

FIGURE 2. Comparison of DSMC and NPS Competencies

Original Competency Model	Revised Competency Model
Sense of ownership (*)	Political awareness
Political awareness (*)	Coaches others (*)(@)
Relationship development (*)	Relationship development (*)
Strategic influence (*)	Self-control (*)(@)
Interpersonal assessment (*)	Results-oriented (*)
Assertiveness (#)	Innovativeness
Managerial orientation	Sense of ownership
Results-oriented	Long-term perspective
Critical inquiry	Managerial orientation
Long-term perspective	Action-oriented
Focus on excellence	Focus on excellence
Innovativeness	Strategic influence
Optimizing (#)	Critical inquiry
Systematic thinking	Systematic thinking
Action-oriented (*)	Proactive information gathering
Proactive information gathering	Interpersonal assessment (*)

Notes:(*) Indicates a competency that distinguishes a successful PM.
(@) Indicates a competency that was added to the PM Job Competency Model.
(#) Indicates a competency that was deleted from the PM Job Competency Model.

relationships they previously established with various agencies. As one program manager stated:

> This may sound like the "good-old-boy" network, which it is, but the Army is personnel- and staff-intensive, so interpersonal relationships, the ability to work with others, is a must.

Competency No. 4

Self Control (*): Remaining calm and unemotional in stressful situations. Several of the program managers who were interviewed said that they knew program managers who were "screamers" and who got angry very quickly. While this may work in the short term, program managers who resort to such actions will never be able to count on those people to "bend over backwards for them in the long term." Most program managers agreed that losing your temper is not wrong as long as you understand beforehand the consequences of that action.

Competency No. 5

Innovativeness: Champions and pushes new ways of meeting program requirements. The acquisition business has no "cookbook" answers; therefore, the Army hires program managers to "manage unique situations effectively." Program managers

must remember, however, that the solution that worked yesterday may not work tomorrow. Thus, the primary responsibility of the program manager is to find out what will work, and do it.

Competency No. 6

Results Oriented (*): Evaluates performance in terms of accomplishing specific goals or meeting specific standards. One of the most important parts of a program manager's job is making each program work and getting it fielded. As one program manager stated:

> Everything you do [as a program manager] has got to be focused on results, results, results.

To get a program fielded, program managers must "put marks on the wall"; otherwise, events will dictate the course of the program. By focusing on results, program managers have a way of setting priorities and measuring the results of their programs against a specific standard.

Competency No. 7

Sense Of Ownership/Mission: Sees self as responsible for the program;

articulates problems or issues from a broader organizational or mission perspective. Sense of Ownership is important from the perspective that one of the primary roles of program managers is to be their program's number one advocate and cheerleader. One program manager put it this way:

> If program managers are not out there "leading the charge" for their systems, they are probably performing a disservice to the taxpayer and the soldier.
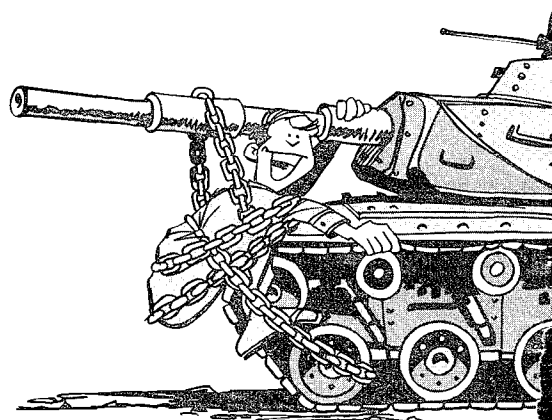
A PM should never become too attached to his program.

A negative aspect of this competency is that Sense of Ownership might imply, to some people, that the program belongs exclusively to the program managers. Program managers should never become personally attached to their programs. They must keep the attitude that "... if the Army says that they don't want the program, I personally don't want it." This allows them to establish the credibility of their programs based on each program's capabilities, without others viewing their actions as personal or vindictive. So program managers must be committed to selling the Army's programs, not their personal programs.
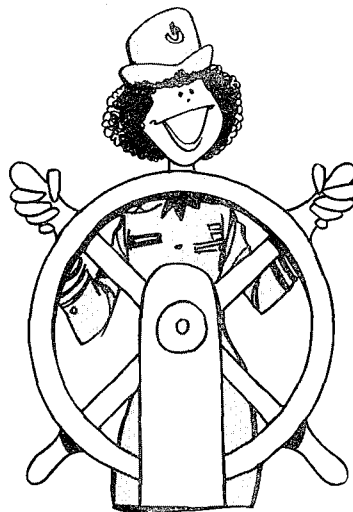
Competency No. 8

Long-Term Perspective: Anticipates and plans for future issues and problems. Most program managers agreed that the most commonly used tool for focusing on a Long-Term Perspective was the DoD six-year budget process. One program manager stated:

> If I had a [financial] problem today, I couldn't fix it in 1994 if my life depended on it, without severe turbulence, because I don't have the money to do it. The 1995 budget is essentially locked...it would take a miracle to change it now. So 1996 is your first year to impact. Without a long-term perspective, I can't do that.

According to current program managers, what distinguishes program managers from their peers is their ability to identify a crisis that will not occur until two years from now. Successful program managers must be able to shape events so that the crisis is manageable when it does occur.

Competency No. 9

Managerial Orientation: Gets work done through the efforts of others. Program managers don't have time to do everything themselves. A program manager's job is to "steer the ship," keep their action officers "heading in the right direction," and then em-

A PM's job is to "steer the ship."

power their subordinates to complete the mission.

One of the key aspects of Managerial Orientation is that it forces program managers to take the time to understand the strengths and weaknesses of their personnel. By understanding their subordinates' capabilities, program managers are able to place those personnel into positions that maximize their strengths and minimize their weaknesses. By empowering their subordinates to accomplish specific missions, program managers have the time to focus their efforts on resolving the major problems before they become crises.

Competency No. 10

Action-Oriented: Reacts to problems energetically and with a sense of urgency. A program's performance is directly tied to how action-oriented its program manager is. To quote one program manager:

> You don't need me if I'm not action-oriented, because I'm paid to respond to a crisis.

The very nature of the role of program managers means that they must deal with crisis on a day-to-day basis.

Most of the examples cited by program managers concerning this com-

petency focused on dealing with crises that pertained to the program's budget. One program manager put it this way:

> When the Pentagon calls and says that you have two hours for an answer, they are not throwing "wolf bait." You have got two hours to get them an answer before the window of opportunity closes. If you don't respond, you have just lost the battle — battles which normally equate to money.

Competency No. 11

Focus On Excellence: Strives for the highest standards regardless of circumstance. Many of the program managers felt that it was easy for people to say that they focus on excellence, but it was much harder to actually do it. As one program manager stated:

> I've never been in a situation in this business where there was an excellent solution. Everything is a trade-off.

So the program manager strives to provide the user and the taxpayer with the best product he can within the constraints of cost, schedule and performance.

Competency No. 12

Strategic Influence: Builds coalitions and orchestrates situations to overcome obstacles and obtain support. Strategic Influence plays an important role in the external environment of a program. It affects how a program is funded, staffed and fielded. Program managers can't get their programs fielded by themselves. They must be able to build coalitions and partnerships, and be able to effectively use them to weigh in for their program when the time comes. One program manager said that the key to building an effective coalition was to:

> ...come across as a sincere and honest person, yet willing to stand up for what you think is

right; then they will probably be willing to compromise if you don't have a dogmatic approach to things.

Competency No. 13

Critical Inquiry: Explores critical issues that are not being explicitly addressed by others. Program managers are responsible for understanding the political environment within which their programs exist. Their skill in understanding other people's agendas, building coalitions, and getting their programs fielded depends on their ability to ask the hard questions "up front and early." This Critical Inquiry, asking the "what if" questions, allows program managers to discover the rationale behind certain answers. As is often the case, program managers can gain more insight from understanding the rationale than from the answer itself.

Competency No. 14

Systematic Thinking: Organizes and analyzes problems methodically. The acquisition of a major weapon system is a complex process. The program manager must not only coordinate the program through its current phase, but also plan for the program's growth throughout its life cycle. The program manager must be able to methodically lay out a plan that will allow the program to get through a particular event as well as future events.

Competency No. 15

Proactive Information Gathering: Systematically collects and reviews information. Very few people are willing to come up and tell you that they have a problem. When something goes wrong, people will tend to "sit on the news, trying to make it better, or hoping the bad news will go away." One of the program managers put it this way:

If a program manager is not proactive, he cannot get the job done. A program manager that is not out finding the problems is in the reactive mode. If I am
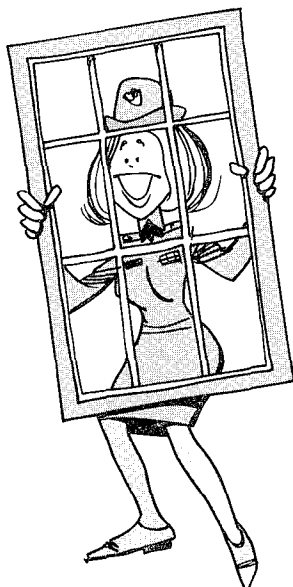
Always look for that window of opportunity that wins the battle.

reacting to a problem, it means it's already here. Already here means I better have the financial ability to do it, which means it's too late. If I'm reacting to a problem, it means that it's probably already over my head.

In short, an effective program manager must find out about problems before they happen.

Competency No. 16

Interpersonal Assessment (*): Identifies specific interest, motivations, strengths and weaknesses of others. Program managers must be cognizant of their own strengths and weaknesses as well as those of their subordinates. One program manager stated that the reason he hired a specific deputy was to balance his own weaknesses:

I am weak in program management, budgeting, cost estimating and contract negotiating. He is an expert in those areas. This balances my own style of management by walking around.

By understanding subordinates' capabilities, program managers will

be better able to manage their programs. They will understand when to "get out of their way" and when they are in danger of "focusing on a few trees in the forest." In short, interpersonal assessment is the ability to "understand and work with people."

Summary

The primary role of an Army Acquisition Category I (ACAT I) program manager is to direct the development and production of a weapon system within the constraints of cost, schedule and performance. To successfully accomplish this, program managers must exhibit certain competencies. Their ability to integrate these competencies into the management of their programs plays an important part in the success of each program. The revised Job Competency Model identifies 16 competencies that current Army ACAT I program managers identified as being important to successful program management. While these 16 competencies can't be seen as a "cookbook" solution for future program managers, they do provide a blueprint of the leadership and managerial skills needed to become an effective program manager.

ENDNOTES

1. Gadeken, O C., "The Right Stuff: Results of DSMC Program Manager Competency Study," *Program Manager*, September - October 1989.

2. Cullen, B. J., and Gadeken, O. C., *A Competency Model of Program Managers in the DoD Acquisition Process*, Defense Systems Management College, Ft. Belvoir, Virginia, 1990.

3. Mc Veigh, Bryan J., *Army Program Managers: A Competency Perspective*, Naval Postgraduate School, Monterey, California 93942-5002, September 1994.

4. It is important to understand that nonselection as a successful program manager did not mean that program managers were poor performers. For the purposes of this study, a degree of full competency as a program manager was assumed

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A Quick Reference for Last Year's Articles

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- Insufficiently Robust DT&E Means Troubles Ahead for OT&E—Raymond W. Reig, p. 12.
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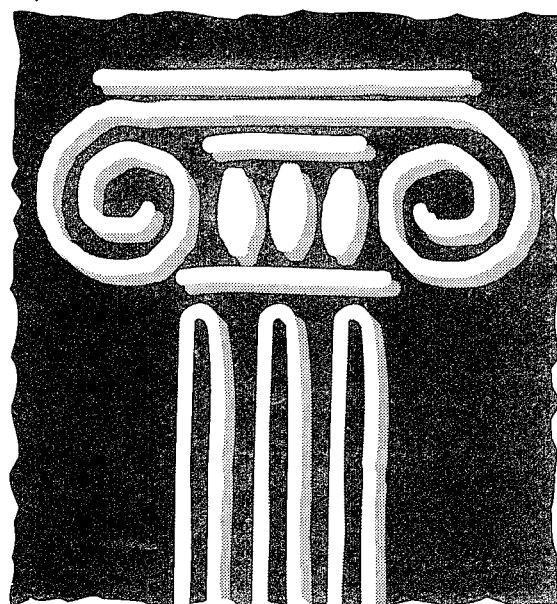- Do We Need the Statement of Work—Dr. Jerome G. Lake, p. 47.

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FIELD TRIP PUTS DSMC X.O.
AT CONTROLS OF AV-8B HARRIER

U.S. Air Force photo

It's a long way from Tempe, Ariz. This thought may well have been on the mind of Tempe native, Maj. Linda Puhek, Executive Officer to the Commandant, DSMC, as she finds herself in the cockpit of an AV-8B Harrier Jet during a DSMC-sponsored industry student field trip to the Cherry Point Marine Corps Air Station, N.C. Explaining the controls are Steve Herold, Shop Supervisor (Left) and DSMC Commandant, Brig. Gen. Claude M. Bolton, Jr. (Right). The 1992 Defense Authorization Bill, signed on 5 December 1992, repealed the 1948 laws banning women from flying on combat missions of the Air Force and Navy.